



Signishaker Commander V-8 Staraner hard-top concertible. Whate sides all affects a new and given and given optional at extra sort,

## The new American car with the European look!

#### It's the breath-taking 1953 Studebaker! Excitingly new in continental styling! Impressively down to earth in price!

THE dramatic 1953 Studebaker sparkles with the verve and flair of Europe's most distinguished cars—but it's thoroughly American in comfort and handling case.

You have your choice of 9 thrillingly styled sedans, coupes and hard-tops—and each comes to you at a down-to-earth price—with Studebaker low operating cost!

Order your '53 Studebaker now-a Champion in the lowest price field—a brilliant-performing Commander V-8.

An exclusive new Studebaker kind of Power Steering is available in the Commander at moderate extra cost.



It's sensational! It's less than 5 feet high! The new Studebaker Starliner hard-top!

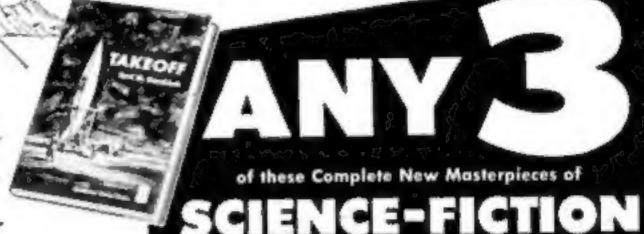
New 1953 Studebaker

## Is Man's First Space Ship Already Being Secretly Built?

SUPPOSE YOU were Mike Novik, engineer. You're HIRED by some amateur rocket crackpots," who are constructing a "dummy YOUR job is to design and construct a ceramic exhaust throat-liner ... for an atomic fael that doesn't exist! Or DOES it? Then why such perfect blueprints? Why are millions being spent on the project—and by whom? Why is the project's chief engineer suddenly MURDERED?

Your suspicions can no longer be stifled. This rocket thip is no dummy-and neither is the master beam behind it!

You'll thrill to every page of this daring Science-Fiction novel, "TAKEOFF." It is just ONE of the existing books offered to new members of the SCIENCE-FICTION BOOK CLUB. Read about the others below then PICK ANY THREE FOR ONLY \$1 on this great



TAKEOFF - See description above.

ENCE FICTION - 43 top stories by outstanding authors . . . stories of startling inventions . . . of stories visitors from Outer Space ... of Far Traveling ... Adven-tures in Dimension ... Worlds of Tomorrow. 562 pages. SANDS OF MARE — You're the first Earth-Man to rocket-crash onto the wild Martion desert-the first to track

down the stronge footprints

and find yourself fac-INE-A MARTIANI

THE CURRENTS OF people on the pisnet Fioring will DIE unless they are warned In time. Only one man , and HE can save them . . must first grow a new memory!

> WEST OF THE SUN-Robinson Crusoe had it easy! This shipwrecked crew of 21st Century scientists is marooned on an unknown planet billions of miles from egrib!

Yours for Only

beautiful women-one born of man and frightened of love

by man and eager for who can kill in TWO places at the same



#### THE BOOK CLUB OF TOMORROW IS HERE TODAY!

I MAGINE-ANY THREE of these full-size, brand-new SCIENCE-FICTION books-a \$7.50 to \$9.00 value-yours for only \$1.00 on this amazing offer!

The founding of this SCIENCE-FICTION BOOK CLUB is a recognition of the fact that Science-Fiction has won a place as an important new ind of literature. It has grown so fast it's hard to keep up with it's How is one to read the BEST new Science-Fiction books-without wasting time and money wading through good and bad alike?

#### Now—The Cream of New Science-Fiction Books-For Only \$1 fach!

The SCIENCE-FICTION BOOK CLUB selects each month the best new Science-Fiction book. It brings you the brand-new full-length books FOR ONLY \$1 EACH (plus a few cents shipping charge)-even though they

cost \$2,50, \$2,75 and up in publishers' editions?

#### NO Dues or Complicated Rules

Each selection is described IN AD-VANCE, in the Club's free bulletin, "Things to Come." You take ONLY those books you want as few as four year. If you don't want the current selection, you simply notify the Club. There are no other rules, no dues, no

#### SEND NO MONEY -JUST MAIL COUPON

We KNOW you will enjoy membership in this new book club. To PROVE it, we are making this amazing offer! Your choice of ANY 3 of the new Science-Fiction masterpieces—at ONLY \$1 FOR ALL THREE, Two are your gift books for joining; the other is your hest selection. This liberal offer may have to be withdrawn at any time. So mail coupon RIGHT NOW to:

SCIENCE-FICTION BOOK CLUB, Dopt, #5-6, Gordon City, New York

#### DO YOU WANT \$1.007 FOR ONLY

#### SCIENCE-FICTION BOOK CLUB Dept. PS-6, Gorden City, New York

Please rush me the 3 books I have checked below, as my pirt tooks and first selection. You will bill me only \$1 (plus a few cents adopting charges) for all three, and corol) me as a member of the Science-Piction Book Club. Every month send me the club's free buildin. Things to Come. 'so that I may decide whether or not I wish to receive the comistion monthly selection described therein. For each took I accept. I will pay only \$1 plus a few them I accept. I will pay only \$1 plus a few cents shipping charge. I do not have to lake a food, every month conly four during each year I am a nember | and I may resign at any time after accepting four selections.

CURRENTS	0F	SPACE
OWNIBUS C	EOP	ADY
OWNIBUS C	F 50	LENCE
FICTION		

SANDS OF MARS TAKEOFF WEST OF THE SUN

delighted, I may return all books in 7 pay nothing, and this membership will be cancelled!

Name	-		+	-		i	i	i	Print
								_	P

Address . . . . . . . 

-----

Copyrigmed installed

## America's Leading New-Idea Magazine for

Founded 1872, Vol. 162; No. 6



Mechanics and Handicraft MIG. U.S. PAT. OFF.

VOLTA TORREY, EDITOR . HOWARD Allaway, MANAGING EDITOR Howard C. Jersen, art editor . Frank Rowsome Jr., assistant managing editor

SENIOR EDITORS: Harry Walton (Mechanics & Handicraft), Hartley E. Howe (Features), Martin Mann (Copy).

ASSOCIATE EDITORS: Alden P. Armagnuc, Thomas Berger, Henry B. Comstock, Devon Francis, Sheldon M. Gallager, Kendall W. Goodwyn, Herbert O. Johansen, Herbert R. Pfister, Denis Sneigr, Robert P. Stevenson, Ruth Westphal.

ART: Harry Samuels (Director), Herbert Anthony, Rolf O. Erikson, Eric Karminski Jr., Richard Meyer, Frances Cooper Daniels.

PROTOGRAPHY: W. W. Morris (Director), Hubert Luckett, Orlando Guerra.

EDITORIAL ASSISTANTS: Harriet Trowbridge, Carol Eunis, Teresa Robbins, Georgette Sparks, Katharine W. Townsend, Jeanne Van Houten.

MIDWESTERN EDITOR: Wesley S. Griswold (Chicago) . WESTERN EDITOR: Andrew R. Boone (Los Angeles)

JUNE, 1953



ARTHUR C. CLARKE

For 81 years POPULAR SCIENCE MONTHLY has featured actual accomplishments of science, This month, 20 pages are devoted to a dream. This dream, of building space stations that will revolve around the earth like the moon, is shared by many scientists and engineers. Arthur C. Clarke of the British Interplanetary Society has written a novel to explain it better to laymen. The novel is candensed on pages 140 to 159.

This Little Car Has Big Ideas	88
Can We Tame the H-Bomb?	96
What Airliner Are You Boarding?	104
New Queen Dazzles the Motor World	108
Anybody Can Build a House	115
"I Flew with Our Radar Scouts"	127
Islands in the Sky	140
The Hut That Jerry Built	177
Hunting with a Camera	182
How to Cure Noisy Valves	190
Gus Puts the Heat on an MG.	194
We're Swimming in a Homemade Pool	200
Plastic Pipe Makes Anyone a Plumber	208
Boat Moorings Save Your Back	212
You Can Handle the Humidity	220
What You Should Know About Magnetos	228
Choosing Blades for Your Circular Saw	234

(More features and departments are listed on page 4.)

#### Codfrey Hammond, Publisher - Stephen P. Clennon, Advertising Derector

ADVERTISING OFFICES: NEW YORK-353 Fourth Ave.; CHICAGO-360 North Michigan Ave.; DETROIT-820 Book Bldg.; SAN FRANCISCO-681 Market St.; CLEVELAND-328 Citizens Bldg.; Los Angeles-2550 Beverly Blvd. EDITORIAL OFFICES: 353 Fourth Avenue, New York 10. N. Y.

Published monthly at 353 Fourth Avenue, New York 10, N. T., by Popular Science Publishing Co., Inc., Godfrey Hammond, President and Treasurer; R. C. Wilson, Stephen P. Giennon, Vice-Presidents; P. W. Briggs, Secretary, Entered as second-class matter Dec. 38, 1918, re-spicered as second-class matter July 26, 1946, at the Post Office in New York, N. T., under the act of March 3, 1879; additional entry as second-class matter at Dayton, Ohio. Entered as second-class matter of the Post Office Department, Canada, Printed in U.S.A. Copyright, 1953, by Popular Science Publishing Co., Inc. All rights reserved in the United States, Great Britain, and in all countries participating in the International Copyright Convention and Pan-American Copyright Convention. Yearly subscriptions to United States its possessions and Canada, \$3.00 (2 years, \$5.50; 3 years \$7.50); foreign countries \$1 per year extra-four weeks! notice is needed to change a subscriber's address. Please give both old and new addresses, including postal time numbers.

# HERE'S PROOF THAT YOU CAN DOUBLE YOUR INCOME BY 1963

Just imagine what you could do with twice your present income! While you're still young, you could afford luxuries usually associated with success...\$65 suits...\$18,000 home...security for your family ... respect from your friends.

If you're like the average I.C.S. graduate surveyed this year, you'll actually be making twice your present income by 1963!

#### FROM \$2,514.63 TO \$5,114.84

This is about what you can expect I. C. S. to do for you if you are an average student. With a little extra effort, you'll be even better off!

391 subjects to choose from. I. C. S. courses cover practical, everyday subjects in a practical, easy-to-follow way. You use your spare time—time that others waste—to acquire knowledge worth thousands of dollars to business and industry. If you want to be twice as well off in 1963 as you are today, mail the coupon below.

Get Expert Guidance with 2 FREE BOOKS. By return mail, you get complete entalog on the career you check. Also 36-page pocket-size guide, "How to Succeed," Both free! Just mark the coupon.



She's holding a sheaf of reports from I. C. S. tenyear graduates. This group alone shows an average pay increase of 103%. You can match it!

Fleturns from 21 states . . . from accountants, draftsmen, engineers, technicians . . . show the following important facts about your expected income over a ten-year period.

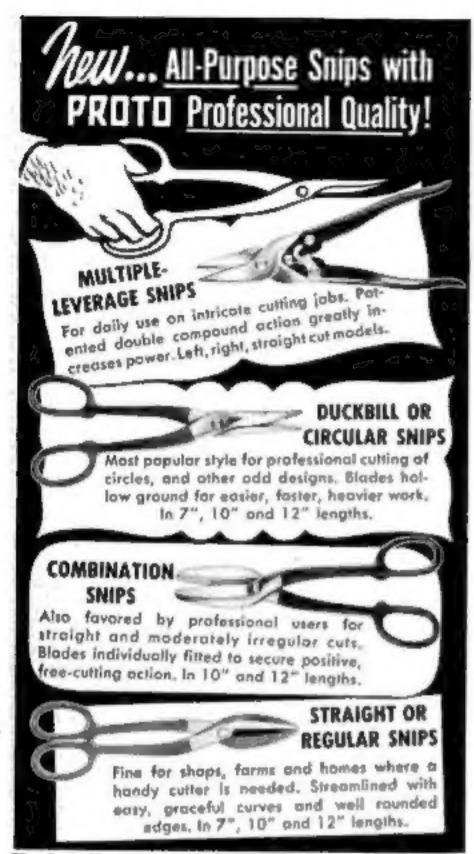
	Age 30	Age 40	% Increase
Average Income for all U.S. men	\$2,449.00	\$2,845.00	16%
Average income for college graduates (men)*	\$3,537.00	\$4,618.00	30%
Average income for 41 I. G. S. graduates sur- veyed Jan. '53	\$2,514.63 before I. G. B. training	\$5,114.84 today	103%
	* From "They West	to College," He	verteun & West



NOTE: The average man or woman will put off mailing this coupon till later. Consider yourself above average if you do it now.

#### INTERNATIONAL CORRESPONDENCE SCHOOLS BOX 7452-N, SCRANTON 9, PENNA. Willoud cost or obligation, sand my "NOW to SUCCEED" and the booklet about the course BEFORE which I have murked X: Stationary Steam Engineering Stationary Fireman RADIO, TELEVIBION, COMMUNICATIONS CIVIL, STRUCTURAL College Properatory ENGINEERING Mathematics Hesting Steam Fitting Cro. | Structural Dr. | Structural Dr. | Structural Dr. | Heading Blueprints | | Concrete Construction | | Sanitary Engineering | | DRAFTING | | Airgust Drafting | | Vical Drafting | Commercial Art Good English Magazine and flook Air Conditioning Illustrating Radio Ser. Radio Ser. Talevision Electronica Telephone Work HAI L HOAD Lecomolisa Eny sel Locamo Electrician Surveying and Mapping Structural Drafting BUSINESS MECHANICAL Cartooning Supress Administration Certified Public Accountable Show Card and Sign Feshion Mustraling Show Card end Sign Lettering [ AND SHOP Radio Servicing-FM Mechanical Engineering Carcounting Caccounting Caccou AUTOMOTIVE Industrial Engineering Automotive Automobile, Mechanic Auto-Elec. Technician Office Auto Body Rebuilding and Refinishing Diesel—Sas Enginee AVIATION Aeronautical Engineering Jr. Airotana Draffing Industrial Supervision Foremanskip Mechanical Drefting Machine flesign-flrefting Locomolius Engineer Diesel Locamotive Machine Shop Practice Air Brakes Car Inspector Personnel and Labor Relations Tool Design Industrial Instrumentation Machine Shop Inspection TEXTILE Aifplane Drafting Reading Blueprints Managing Small Business Sheet Metal Drafting **Textite Engineering** Toolmaking Sates Management Mine Surveying and Drafting Cotton Manufacture BUILDING Architecture ELECTRICAL Gas - Electric Welding Rayon Manufacture Salesmanship Traffic Management CHEMISTRY Arch. Drafting Electrical Engineering Heal Treatment - Melallurgy Woolen Manufacture Loom Fixing **Building Contractor** Electrician Sheet Metal Work Chemical Chemistr Anglytics Petroleus Pulp and Plastics Decrease foundaments Finishing and Dyelek Enlimating Sheet Metal Pattern Drafting Chemical Engineering Carpenter Carpenter Reading Bi House Plan Carpenter and Mill Work Carpenter Foreman Chemistry Anglytical Chambally Electrical Drafting Refrigeration **Textile Cesigning Excisic Power and Light** POWER Combustion Engineering Diesel—Electric Gillectric Light and Power Combustion Engineering Diesel - Electric Reading Blumprints House Planning YEAR OF THE SIX Petroleum - Nat'l Gas Pulp and Paper Making HIGH SCHOOL MILLIONTH STUDENT ☐ High School Subjects Home Address. Working Hours .... Special busion rates to members of the Armed Forces. Canadian residents aund coupon in International Correspondence Schools Canadian, Ltd., Montrest, Canada

Copyrigmed Insulated



Truly all-purpose, PROTO's new snips fill the needs of practically all industries, mechanics and craftsmen. Four basic styles cut hundreds of materials. And you get true professional

The PROTO Line-Includes Wronches, Pliers, Serumdrivers, Punches, Chisels, Seckets & Attachments, Puliers, Industrial Tools, Many quality in PROTO snips! They give smooth, fast, accurate cuts... produce better finished work, clean and unbent... have great strength and toughness... are stardily built. Buy these professional, all-purpose snips from your PROTO dealer. Send 104 for 68-page catalog of entire line to



Eastern Factory-Jamestown, N.Y.

#### News and Pictures

Mems with Littles
Gunmen Test Rifles in Deep Freeze 85
Turbo-Train to Run on Bottled Gas 86
New Power Steering Fits Old Cars100
Gears and Bearings Made by the Yard102
3-D TV?107
Hang It Up120
They Begin Where Detroit Leaves Off122
How Gas Gauges Work134
Earthquakes Are His Hobby136
River Speedometer Aids Flood Control 162
Magnesium Car Is Lighter Than Plastic 165
How You'll Fly in 1975168
From Flatbed to Home Trailer174
Mechanics and Homebuilding
Record Caddy Totes Phonograph180
New Garden Gadgets187
Gadgets for Your Car199

#### NEXT MONTH ...

#### Home-Workshop Index

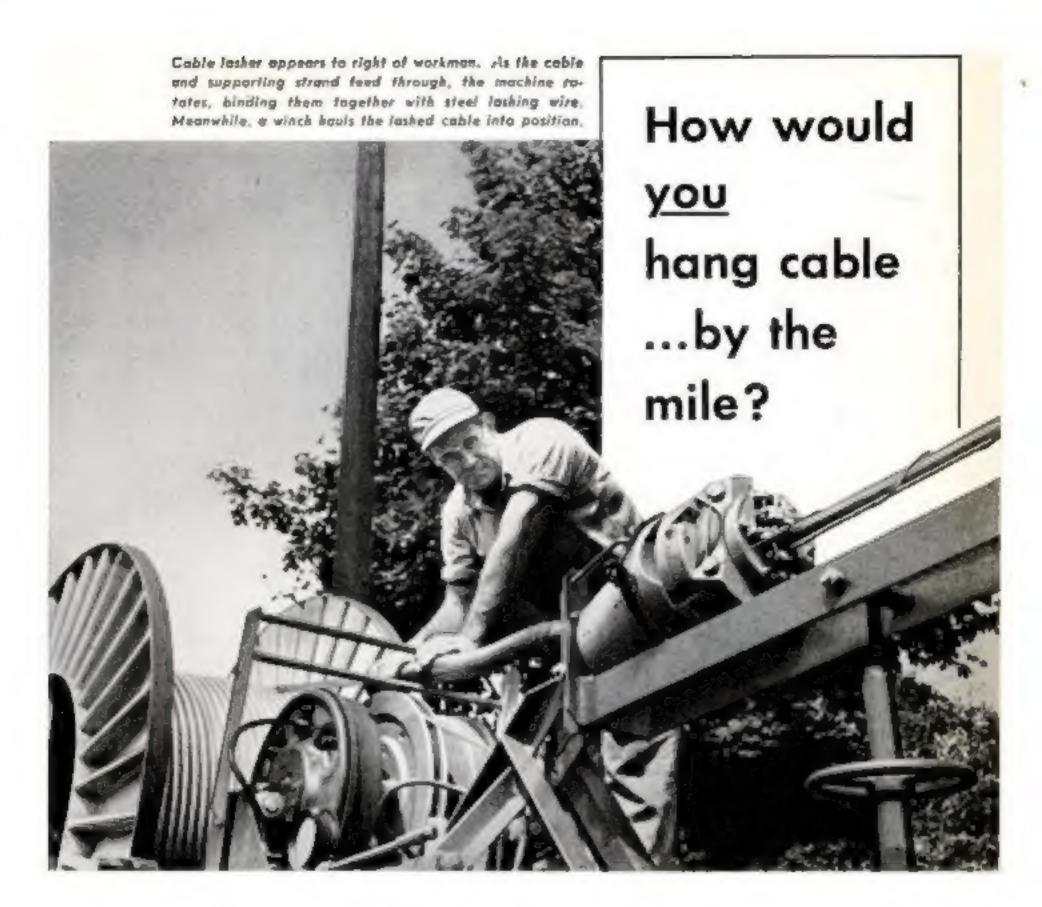


The unhappy fellow above doesn't know that a complete index to PSM's Mechanics and Homebuilding sections for the past year will appear in the July issue. Fully cross-indexed, this guide will help you find hundreds of valuable homeworkshop ideas in that file of back copies.

Canvas Sun Roof Shades Your Terrace...218
Extra Service from Plastic Bottles.........225
PSM File Keeps Copies at Hand............226
Steam-Car Engine Runs Side-Wheeler....238

#### Departments

Letters	10
New Ideas from the Inventors	13
I'd Like to See Them Make	
P.S. Last Minute News and Notes	
New Tools	
Hints from the Model Garage	
New for the Handy Man	206
Keeping the Home Shipshape	116
New Shop Ideas	



It is a job your telephone company faces every day. Thousands of miles of cable go up each year—all secured to steel strand running from pole to pole. The best way to secure cable is to lash it to the strand with a spiral binding of wire.

One way to do this is to raise cable and strand separately, then lash them together by a rotating machine pulled along by workmen on the ground. This produces a strong, tight support for the cable. But each pole has to be climbed as many as four times. So Bell Laboratories engineers devised an easier way.

Now, lashing can be done on the ground so that cable, strand and lashing wire may be pulled into position as a complete assembly. Usually workmen need make only two trips up each pole.

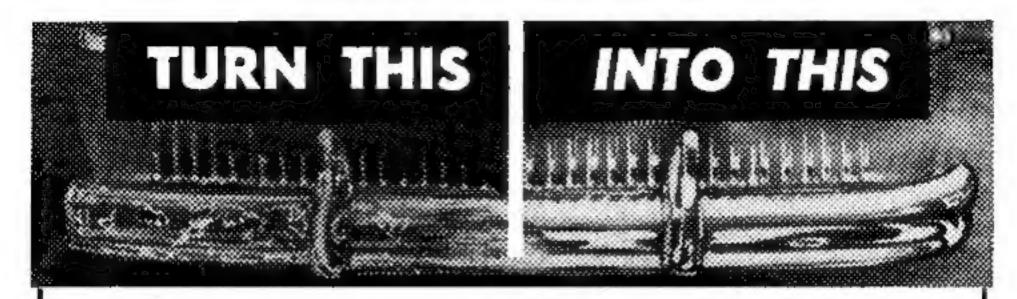
For telephone users, the new way means that cable can be installed faster, while costs are kept down. It shows again how work at Bell Telephone Laboratories improves each part of your telephone system.



## Bell Telephone Laboratories

improving telephone service for America provides careers for creative men in mechanical engineering

## AT LAST! A CHROME RESTORER THAT WORKS!



Amazing new 2-way chrome protector wipes away rust — pits — corrosion — in just 2 minutes! Stops rust from forming! Keeps chrome mirror-bright!

Now keep your bumpers, grillwork, window-frames, all chrome on your car sparkling bright as the day you bought it! Keep it rust-free for life! No matter how badly pitted or scarred, this sensational new 2-Way Chrome Protector wipes it Mirror-Bright, prevents new rust and corrosion from forming!

ONE APPLICATION LASTS ENTIRE SEASON—gives you safe, foolproof protection against vicious biting erosions of SALT AIR — SUN — RAIN — SLEET — etc. 101 USES — for fishing reels, boat trims, bicycles, sporting equipment, etc.

#### NOW-YOU GET 2-WAY CHROME PROTECTION

Complete Chrome Protector Kit containing:

1—Bottle of RUST REMOVER chemical with special applicator. Enough to remove all rust from car.

2—Can of PROTECTOR chrome rust preventer and applicator. Enough for years of safe protection.

#### ABSOLUTE GUARANTEE

RESULTS ABSOLUTELY GUARANTEED

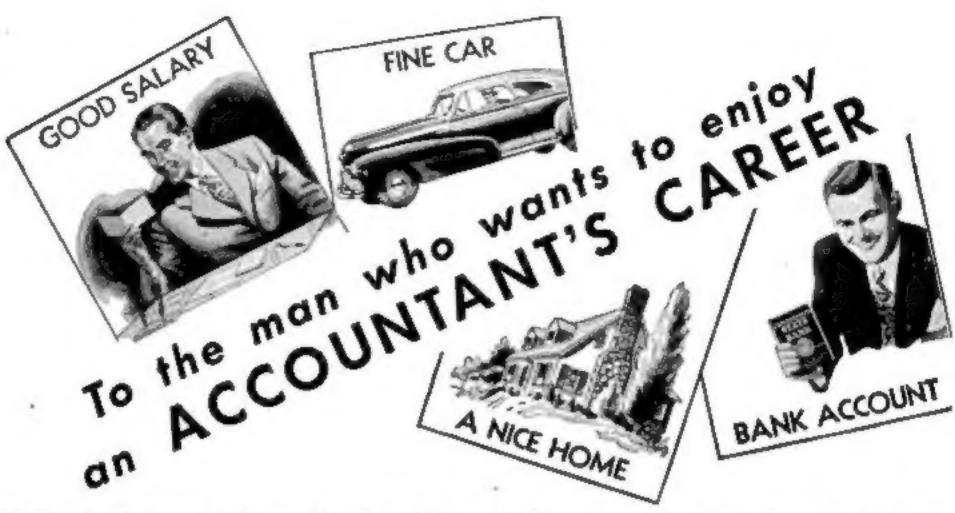
OR MONEY BACK! Enclose \$2, check
or money order with your name and
address.

H. SEARS INDUSTRIES, INC., Dept. C-370 799 Broadway New York 3, N. Y.

#### CLIP THIS COUPON NOW!

Dag	SEARS (NDUSTRIES, Inc. or. C-370, 799 Broodway or York 3, N. Y.
Flac I et plet	is send me a complete Chrome Protector Kit. Actions \$2. I understood that if I am not com- ely notisfied with the kit, my manay will be aded.
NA	MF
ADI	DRESS
CIT	Υ
STA	†E

Copyrighted material



IF you're that man, here's something that will interest you.

Not a magic formula—not a get-rich-quick scheme but something more substantial, more practical.

Of course, you need something more than just the desire to be an accountant. You've got to pay the price —be willing to study earnestly, thoroughly.

Still, wouldn't it be worth your while to sacrifice some of your leisure in favor of interesting home study—over a comparatively brief period? Always provided that the rewards were good—a salary of \$4,000 to \$10,000?

An accountant's duties are interesting, varied and of real worth to his employers. He has standing!

Do you feel that such things aren't for you? Well, don't be too sure. Very possibly they can be!

Why not, like so many before you, investigate LaSalle's modern Problem Method of training for an accountancy position?

Just suppose you were permitted to work in a large accounting house under the personal supervision of an expert accountant. Suppose, with his aid, you studied accounting principles and solved problems day by day—easy ones at first—then more difficult ones. If you could do this—and could turn to him for advice as the problems became complex — soon

you'd master them all.

That's the training you follow in principle under the LaSalle Problem

Over 3500 Certified Public Accountants emeng LeSalia alumni

You cover accountancy from the basic Principles right up through Accountancy Systems and Income Tax Procedure. Then you add C. P. A. Training and prepare for the C. P. A. examinations.

As you go along, you absorb the principles of Auditing, Cost Accounting, Business Law, Statistical Control, Organization, Management and Finance.

Your progress is as speedy as you care to make it—depending on your own eagerness to learn and the time you spend in study.

Will recognition come? The only answer, as you know, is that success does come to the man who is really trained. It's possible your employers will notice your improvement in a very few weeks or months. Indeed, many LaSalle graduates have paid for their training—with increased earnings—before they have completed it! For accountants, who are trained in organization and management, are the executives of the future.

#### Write For This Free Book

For your own good, don't put off investigation of all the facts. Write for our free 48-page book, "Accountancy, The Profession That Pays." It'll prove that accountancy offers brilliant futures to those who

we'll also include "Ten Years' Promotion in One"—a book which has helped many men. Send us the coupon now.

#### Other LaSalie Opportunities

Method.

| Righer Accountancy | C.P.A. Conching | Bookkeeping | Law: LL.B. Degree | Business Management | Salesmenship | Traffic Management | Foremanship | Industr'l Management | Stenotypy (Machine Shorthand)

## LASALLE EXTENSION UNIVERSITY

A CORRESPONDENCE INSTITUTION
417 1 Dearborn St. Dept. 683-HR Chicago 5, Ill.

I want to be an accountant. Send me without obligation, "Accountancy, the Profession that Pays" -- also "Ten Years' Promotion in One."

City, Zone & State .....



Copyrighted material

## Why pay more?

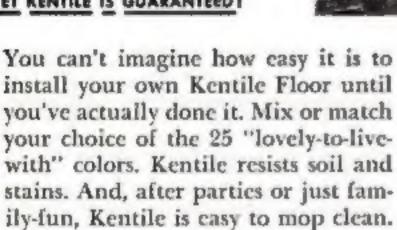
You can install a guaranteed

## KENTILE

like this for only \$2750\*



A KENTILE FLOOR LIKE THIS COSTS \$9 to \$22 LESS THAN TILE FLOORS OF MANY OTHER MATERIALS... YET KENTILE IS GUARANTEED!



It's easy to keep glistening like new with an occasional no-rub waxing, too. These modern colors can't get dull or wear off . . . they go clear through the rugged, durable tile. That's why more people buy Kentile . . . because Kentile gives more value.



#### Only KENTILE DEALERS have these money-saving buys in GUARANTEED FLOORS

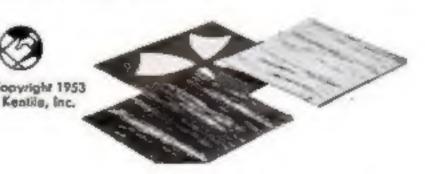


Price quoted is for a floor approximately 11'6" x 9'3" installed by you, Your floor may cost less or slightly more depending on size, colors and freight rates. See your local Kentile, Inc. Dealer for FREE estimate. His name is listed under FLOORS in your Classified Telephone Directory. In Canada, T. Eaton Co., Ltd.

KENTILE, INC., 58 2nd Avenue, Brooklyn 15, N. Y.

KENTILE.

The Asphalt Tile of Enduring Beauty



## FREE...10 HITLER STAMPS



## 10 Scarce Stamps-All Different-Sent Free

TO SECURE NAMES FOR OUR MAILING LIST

AlL coupon at once. We'll send you this fascinating set of 10 Hitler stamps. Different sizes, colors, values. NO COST TO YOU.

These valuable stamps were issued by the short-lived nation of Bohemia-Moravia. They are much acught after. Now they are becoming SCARCE. And since the nation is no longer in existence-no new issues can be minted. Our supply is limited. So, don't ask for more than one set

#### PREE 32-PAGE BOOK

In addition to the PREE Hitler Stamps, we'll also include other interesting offers for your inspection-PLUS a FREE copy of our helpful, informative book. "How To Collect Postage Stamps," It contains fascinating and true stories such as the one about the le stamp (which a schoolboy gladly sold for \$1.50) and which was later bought for FORTY THOUSAND DOL-LARS.

This Free Book also contains expert advice on collecting; shows how to get started; where and how to find rare stamps; how to tell their real value; how to mount them, trade them; how to start a stamp club; exciting stamp games, etc. It has pictures galore! Full pages of pictures showing odd stamps depicting native men and women from faraway lands; feroctous beasts, etc.

#### MAIL COUPON NOW

Be the first in your neighborhood to have this valuable set of Hitler Stamps. Your friends will envy you for it and want to buy the set from you. It will become one of the most prized sets of any stamp collection. But you must harry if you want to get the II Hitler Stamps FREE. This special offer may have to be withdrawn soon. If coupon has already been used, write direct to: Littleton Stamp Ca., Dopt. 6-PS, Littleton, New Hampshirp. (Enclose 10t to help tover pestage and handling).



LITTLETON STAMP CO., DEPT. 4-PS, LITTLETON, N. H.

Send-AT NO COST TO ME—the valuable set of 10 Hitler stamps and the informative booklet, "How To Collect Postage Stamps." I anclose 10¢ to belp cover postage and handling.

# How HATLESS MEN keep hair neat all day long!



- New-formula grooming aid gives hair naturally-nester look without goody grease or cream!
- Removes flaky dandruff... makes scalp feel better, more refreshed!

Whether you go hatless or not, keep hair neatly groomed all day the way so many outdoor men do—with Fitch Idea!!

See the neatest trick of all—as ideal's secret grooming agent...not a grease, oil nor cream...makes thin hair look thicker—thick hair stay slicker!

Ideal also relieves dry, itchy scalp—also removes loose dandruff—while it works its grooming miracles!

Feel its new tonic action. Feel your scalp tingle with invigorating freshness!
Note—there's no lingering, tell-tale odor!

Start tomorrow. Just seconds—massaging hair and scalp with a dash of new Fitch Ideal—will pay off all day! You can count on Fitch Ideal for that smart, naturally-nester look of the man who's going places! At all drug counters—also ask Barbers for professional applications.

Get new

FITCH Ideal HAIR



#### One Vote for Science

I know it is impossible to please all the public all of the time, and even very hard to please some of the public some of the time; but let's not forget that word science in the title of your magazine.

DOUGLAS THOMAS, Alamosa, Colo.

Please try this month's article on the H-bomb (p. 96).

#### Here's a T for You

I would like to inform all concerned that there is a Ford Model T roadster in a field with other farm scrap about two nules north of Batesville, Ind., on the left side of the New York Central Railroad tracks, condition unknown, as I just noticed it from a fast train.

If this information cases someone's pain, I smoke cigars and think the tip would be worth a box of same.

GUY M. TAYLOR, Newport News, Va.

#### How to Find Hard-to-Find Items

A handy man or craftsman at one time or another needs some item that is hard to find. I've located many hard-to-find articles



just by knowing the right people—the electric-meter reader, the water-meter reader, plumber, electrician, fuel-oil delivery man, insurance collector, milkman. Basically the people to see are the ones whose jobs take them into people's homes, cellars, garages, attics, barns, etc., where hard-to-find items may be stored and forgotten about. Once

## WILL TRAIN YOU AT HOME PAY JOBS America's Fast Growing Industry Offers You 2 FREE BOOKS SHOW HOW MAIL COUPON

LOST JOE, HOW HAS OWN 1860 "test last off my funchine thep thing aver happened as I opened a full time Radio Shop Business T Blate Corncano, Total

and Broadcast Engineer at ULPM Abother technique and there apened a Radio TV network to about the same Big TV sales here to be to the than the can handle." — J is Bangley, Suffeile, Va.



THE TO SEE WHEN SPANS THAC Four months after enterling for NEI spaine. The able to servtre Radius averaged life to \$16 a week spare time. New take full tama And a and Televisies business." -- William Wayde Breekips, New York.

#### AVAILABLE TO UNDER G.I. BILLS

ezanizub nwo buoy tnav

Let me show you how you can be your numbers. Many NRI trained men start their awn bestroes with capital earned in spare time. Rabort Deb-



men, New Prague, Brees, whose state to show at left says, "Ass new tind to with two Television." euritte and de warearly work for dealers. Often full back to 3/3/2 textbooks for information."

Many students make \$6, \$10 a week and more EXTRA fixing neighbors' Radios in spare time while learning. The day you enroll I start sending you SPECIAL BOOKLETS that show you how. Testar you build with kits I send helps you make extra money servicing sets, gives practical experience on circuits common to Radio and Television. All equipment is yours to keep.

NRI Courses lead to these and many other jobs: Radio and TV service, P.A., Auto Radio, Lab, Factory, and Electronic Controls Technicians, Radio and TV Broadeasting, Police, Ship and Airways Operators and Technicians. Opportunities are increasing. The United States has over 106 million Radios-over 2,900 Broadcasting Stations-more expansion is on the way.

Think of the opportunities in Television. Over 15,000,000 TV sets are how in use, 108 TV stations are operating and 1800 new TV stations have been authorized . . . many of them expected to be in operation in 1953. This means more jobs good pay jobs with bright futures. More operators, installation service technicisms will be needed. Now is the time to get ready for a successful future in TV | Find out what Radio and TV offer you.

### You Learn Servicing or Communi by Practicing



Ever your job while training at home. Rundreds I've trained are presental RADIO-72LEVISION Technicians. Most had no provious esperience; many to more than rammer actual education Laure Andle-Tetevision principles from Destrated lessans. Too also get PRACTICAL EXPENIENCE PIO turned at last, are just a few of the piness of applicant you half with the of party | send. You st-periment with, lawn circuits eath on to Radio and Talevisies

that Coppensated our what Mile INLIVENCE Can be for You

Act Now Eand for my PREE DOUBLE OFFER Coupes entitles pog to actual Servicing Laurent; shows how you learn at bone. You'll blan Physicist Bay ner book, "Hew la Be a Surren la 1. Barnd company in postal J E SNITH,

Pres., Dept AFE Rational Radio Institota, Washington P. D C Our 19th Test



MR J. S. SMITH, Populated, Book. 350 Halland Rudy Indiana, Westington 9, S. C. Man are Sample Lauren and 61-page Burk, PRES. (No selection will call Plants wrote planning J

N	11 101111111111111111111111111111111111	Age.
Address		
City	Zeer.	

VETS This had

## Quietest Tread on Earth... Outgrips, Outwears them all!



safety, silence, comfort found in no other tire. (1) Interlocking Safety Tread for greater "hold" in all directions. (2) Silent Traction Design cancels out hum and sing for world's quietest ride. (3) Intra-Tread Bumpers hold tread ribs apart... muffle squeal. (4) Uni-Cushion Contour—more rubber on road for smoother riding, longer wear.



#### Unconditionally Guaranteed 3 Years!

Unserviceable tire will be replaced by comparable new tire with full credit for the period of guarantee not realized.

ARMSTRONG BURBER COMPANY, West Haven 16, Cour., Norwalk, Com., Natchex, Miss.; Des Moines, laws; 601 Second Street, San Francisco, Calif. Export Division: 20 East 508: Street, New York 22, N.Y.

an item has been located, the rest is easy. It's surprising how willing the owner usually is to be rid of something that's junk to him but a treasure to you.

ARTHUR R. TANNER, Cold Spring, N. Y.

#### Race-Car Builder Likes Tach

I especially like the fine coverage Popular Science gives automotive topics. As I build and drive dirt-track race cars, I welcomed your electrical tachometer [Dec., p. 174] with open arms. The simplicity of the instrument amazed me, and comparison with a mechanical tach indicates its accuracy. W. A. Cowan Jr., Calgary, Alberta, Canada.

#### **How Old is New?**

As an antique-car collector, I am disappointed that POPULAR SCIENCE MONTHLY



would give space to the restoration of a 1925 Ford. Among collectors this is a "new" car.

B. PAUL MOSER, Los Angeles.

#### Rear Engines for Safety

Your article "Are Rear-Engine Cars Coming?" [March, p. 116] lists some convincing arguments in favor of putting the engine in back, but it overlooks the most important of all—the part rear-engine location will play in reducing accidents.

The first of the objections you report, for instance, is that "too much weight at rear creates tendency to skid." If it is "too much" at the rear, it is more so over the front wheels, where it makes the car nose-heavy and where it obviously ignores the laws of gravity and centrifugal force.

Other objections listed include:

"Engine ahead of passengers is a safety factor in collision." This is a myth. The engine is bolted down, but the passenger isn't. The only safe collision is the one that doesn't happen. Fewer accidents will happen if the engine is in the rear and the driver is up front where he can see to drive safely and will appreciate the danger of driving too fast.

"Moving the engine back complicates con-



## ELECTRICITY-

The Power Behind Our Industrial Program

A great opportunity field and vital to Defense. Thousands of trained Electrical and Electronics men needed in good jobs and a real future. Why be satisfied with a ' no future' job? Get Free Book that tells how thousands have prepared quickly for Electricity and Electronics at Loyne.

#### TRAIN QUICKLY AT COYNE FOR VITAL FIELDS

ELECTRICITY RADIO-TELEVISION-ELECTRONICS-VITAL In Industry and Armed Forces, TRAIN QUICKLY for better rating if drasted vital job in Industry, if not. Trained men whether \$7 or ap to 45 needed Prepare now for steady, well paid, essential jobs in A FIELD THAT ALSO OFFERS A REAL FUTURE WHEN THE EMERGENCY IS OVER.

#### FINANCE PLAN-TART NOW-PAY LATER

Enroll now, pay most of tultion later. Mosthly payment plan especially designed for hiteta. If you need part time work to he', or t with haing expenses while at Coyne, we'd help you get it. Special taition plan for men of Draft Age.

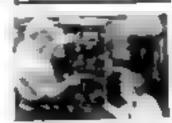


TOLD the of cach job.



You're shown bew to do typical jobs by trained instructors.

#### APPROVED FOR VETERANS



You DO practical job YOURSELF on equipment.

#### Mail Coupon for Big Gree Book

Whetheryou prefer Electricity or Television Radio, train on actual equipment, at Coyne, Fill in and mail coupon TO-DAY Paste it on a postrard If you wish. A big faily showtrated booklet and complete details will come by return mail. No salesman will call.

M. W. COOKE. President



ent of Layre prof sometime

1 . . . a s tight on tree I may bloods

CHARTERED NOT FOR P 800 S. Paulles Dept. 42-7311 Chicago 12, Illinote

FFRIBENATION 🛊 ELECTRONICS STEEL ERPIRE ME HETERHOGAL DE

т			
	n. w. COOKE	, President	
	COVYS SCHO	IOL	
		St., Chicago 13	
	Dept. A3-7311		

Send your BIG FREE BOOK and details of your training offer This does not all gate me and no selection will call. I am inversed in TELEVISION-RADIO □ ELECTRICITY

ı	NAME,		 			
I	ADDRES	S	 	***	*****	
1	CITY		 	STATE		

JUNE 1953 3



## shake it on every morning then...



# QUINSANA FIGHTS ATHLETES FOOT INFECTION

QUINSANA works full-time—and fast?
9 out of 10 report amazing results.
91% of foot specialists interviewed used it on their patients.
For burning, itching feet—cracking, peeling skin... get
QUINSANA quick!

Soothes, cools tired feet!

MENMEN

QUINSANA

ATHLETES
FOOT

TAX FREE

trols and cooting systems." These have been no real problems to various European ears—the Tatra, Mercedes-Benz, Renault, Volks-wagen, etc., over a period of 20 years, nor to American buses that have been in use over the past 15.

"Excessive weight at rear might require dual wheels." Engine weight at present is over the front wheels; it doesn't require dual wheels. Why would it do so if moved to the rear?

As a matter of fact, the engine is in front in today's passenger car because that is where the horse was when autos were first made 60 years ago.

> ARTHUR W. STEVENS, President, Automobile Safety Assn., Boston.

#### Orchids for PSM Writer

You are to be commended for the railroad articles that have been appearing in your magazine. That Henry B. Comstock is a topnotch railroad writer.

GORDON S. HAMILTON, Berea, Ky.

#### Look-See Malibox

I notice that one of your readers says he'd like to see them make a clear plastic, rural-



type mailbox so that both the postman and owner could readily see if there was any mail to pick up. Well, I've invented one, and here is a picture of it.

THOMAS O. WRIGHT, Atlanta.

#### Do It the Easy Way

Another of your readers recently suggested that fuse boxes come equipped with a built-in, battery-powered lamp to eliminate hunting up a flashlight every time a fuse blows.

Why a battery? Just put the lamp on the hot side of the fuse box.

FRED A. COVEY, St. Helena, Calif.

M POPULAR SCIENCE

## INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

The Patent Laws were enacted for the benefit of the inventor to give him protection for the features of his invention which are patentable. These features must be properly and concisely set forth and claimed in a formal application for patent, in order to comply with the requirements of the Patent Laws. For that reason, unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and are prepared to serve you in the handling of your patent matters.

A specially prepared booklet entitled "Patent Guide for the Inventor", containing detailed information with respect to patent protection and procedure, together with a "Record of Invention" form will be promptly forwarded to you without obligation upon request.

#### CLARENCE A. O'BRIEN & HARVEY JACOBSON

Registered Patent Attorneys

32-F DISTRICT NATIONAL BUILDING

WASHINGTON 5, D. C.



## You Can Influence Others With Your Thinking

TRY IT SOME TIME. Concentrate intently upon another person scated in a room with you, without his noticing it. Observe him gradually become restless and finally turn and look in your direction. Simple—yet it is a positive demonstration that thought generates a mental energy which can be projected from your mind to the consciousness of another. Do you realize how much of your success and happiness in life depend upon your influencing others? Is it not important to you to have others understand your point of view — to be receptive to your proposals?

How many times have you wished there were some way you could impress another favorably — get across to how or her your ideas? That thoughts can be transmitted, received, and understood by others is now

scientifically demonstrable,

#### This FREE Book Points the Way

The tales of mireculous eccomplishments of mind by the ancients are now known to be fact—not fable. The method whereby these things can be INTENTIONALLY, not accidentally, accomplished has been a secret long cherished by the Rosicrucians—one of the schools of ancient wisdom existing throughout the world. Write for the free copy of the facinating sealed book, "THE MASTERY OF LIFE," which explains how you may receive this unique wisdom and benefit by its application. Address: Scribe V.C.V.

## The ROSICRUCIANS San Jose, (AMORC) California

USE THIS COUPON
Scribe V.C.V
The Rosicrucians
San Jose, California
I am sincerely interested in an intel-
ligent method of attaining a mastership
of life. Send me without obligation,
your FREE Book which explains how
I may receive and use your age-old
method.
Name
Address.
City









,-----------

#### Many Finish in 2 Years

No classes. No time wasted going to and from school. Progress as fast as your time and abilities permit. Standard H. S. texts supplied. Thousands enroll each year in this ab-year-old school. Send for FREE descriptive booklet.

AMERICAN SCHOOL, Dept. HA46 Drexel at 58th St., Chicogo 37, III,										
Without obi	igation	i, plear	se send	FREE d	escri	otive				
Name			***************************************		un.					
Address										

## INVENTORS

If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

The firm of McMorrow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for

patent.

Unless you are fully familiar with the U. S. Patent Laws, we recommend that you engage the services of a Registered Patent Attorney to protect your interests. The patent laws are your laws. A patent gives you the right to prevent others from making, using or selling the invention claimed in your patent for a period of 17 years.

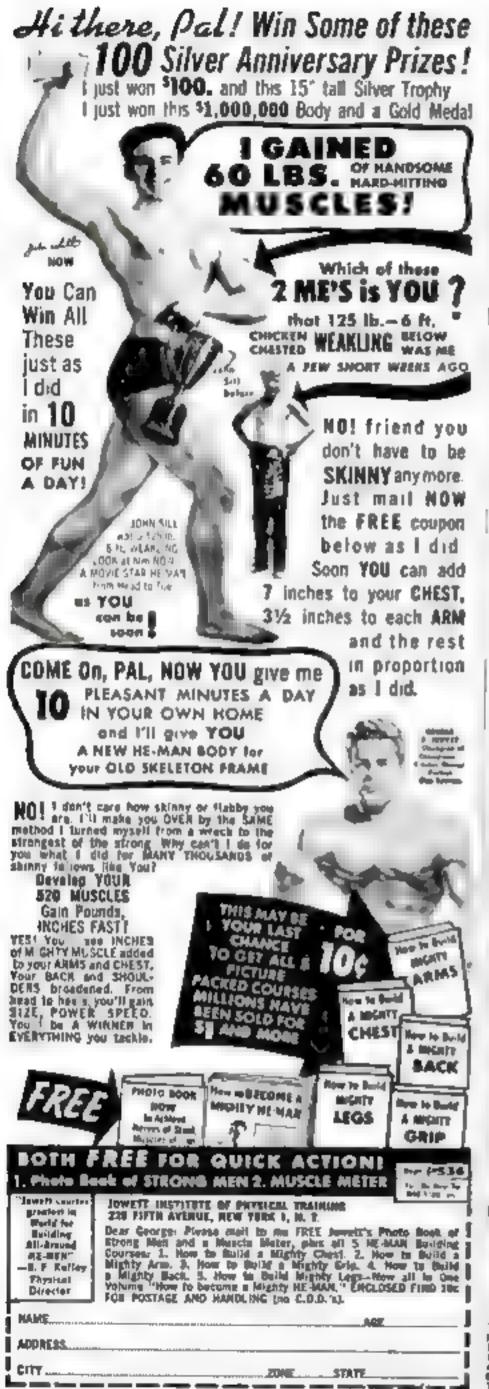
Use these patent laws for your protection. Investigate whether your invention can be patented. If you have what you believe to be an invention, we suggest that you have this firm make a search for you.

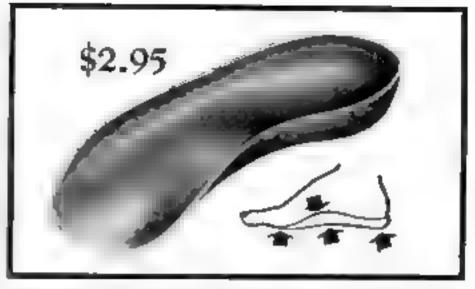
Send for a copy of our Patent Booklet entitled "How To Protect Your Invention," containing information about patent protection and patent procedure. Along with this we will also send you an "Invention Record" form, for your use in writing down and sketching details of your invention. We will mail them promptly. No obligation. They are yours for the asking

#### McMORROW, BERMAN & DAVIDSON

Registered Patent Attorneys

PATENTS • COPYRIGHTS • PATENTS
142-L VICTOR BUILDING, WASHINGTON 1, D. C.



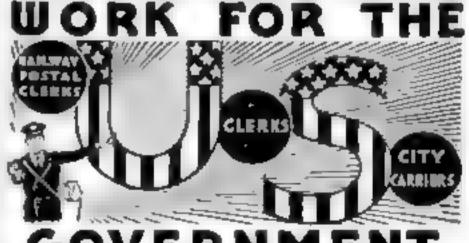


#### Zinke's Natural Foot Form Support

Treat your feet to "walking on air" supports that cushion heel, arch, instep, and metatarsal joints the way nature intended. No rigid metal! No steaming rubber! No "elevation" foot Form is scientifically molded to breathe and flex for cool comfort and supple support. One pair fits all your shoes. Money back if you and your feet aren't deaghted Give shoesize and width. Specify men's or women's, \$2.95 post paid. California Leather Jobbing Corp., Room 126-A, 963 Harrison St., San Francisco 7, Calif.







### GOVERNMENT

START AS HIGH AS

S3 795 00 YEAR

Many Appelerments To our charge,
Be made. Experience & Government
Oxactly Not Roour charge,
or these tabs
CH Mari Compon
Today—Sore.

Address . .

FRANKL'S 1857 Full Dept 2-80 Rochester 4. S. Y. Not Government Controlled: 5 m: Rush without charge, () 52-page book with list of U.S. Government John. (2) Tell ma how to get one of these John.

the see acceptance to the Again, and

NOW...from D.T.I.'s MILLION DOLLAR TRAINING CENTER

# Learn to master TELEVISION RADIO - ELECTRONICS by getting EVERYTHING YOU NEED!

NOWget training to suit your NEEDS American amazing multi-billion dollar Talavision field now affect you a charter of a literature to get started toward a grand job or your awa business. With TY station smill now reised from over 180 to 2053, Television is basided for almost every community. Mail coopen lodgy. See how you may propers to tesh in on the coming TY 800M.

## Come to TAKE YOUR AT HOME!...including setting up your own HOME LABORATORY

great CHICAGO
LABORATORIES

To the Nation's FINEST!

Now, in the heart of the nation's TV Center, you can get all of your preparation in DT.1.'s big, modern, wonderfully equipped fraining laboratories. Loads of commercial equipment and ample, well qualified instructors help you get a thorough, practical preparation in the SHORTEST POSSIBLE TIME. Part time student Employment assistance can help you pay your way while in training.

#### EMPLOYMENT SERVICE

As soon as you complete either the Chicago Laboratory or Hame Training, you'll find D.T.L's grand Employment Service ready to help you start earning real money. Get full facts. Mail coupon today.

89 WAYS

MILITARY SERVICE If subject to military service, the training information we have for you should prove very helpful. Mail coupon lodgy

Get this publication FREE!

DefOREST'S TRAINING INC. Dept. PS-6-1 2523 N. ASHLAND AVE., CHICAGO 14, III.

I would like your Opportunity News Bulletin showing "69 Ways to Earn Money in Television Radio-Electronics also, complete facts about the framing apportunity made possible by your organization.

Neme	Age
Address	Apt
City	ZunuSlate



ABOVE Tou build and keep this big 5 HeCH commercial-type estillercope — one of the most exeful test with eyed in TV lader.



See how you may now get one of teddy's most complets, effective combinations of major hame training ends—including (1) well (illustrated tessons, (2) the wanderful aid of HOME TRAINING MOVIES and (3) 21 big shipments of efectionic parts for setting up your own HOME (ASORATORY You work over 400 construction and test protestures to get the practical auporional you need. This includes building and heaping a 5 MICH "SCOPE," provet bearing MULTI-METER and a hig 21 MICH TV SET (0.1), effect unather home training in Television-Radio-Electronics, but without the 2V 1013 Molt soupen today for exciting facts.





MOVIES pertent basic points factor . . .

FILEVISION TRAINING CENTERS"



De FOREST'S TRAINING, INC.



COVERS 907 MODELS BUILT SINCE 19351

Quid-Hair Chavralet 自物を与り1年に DCOP. PT Ge Sebn Ded HT Fige # Frager Manty & He ser Lurayette Le Salis Lincoln

Меститу Mann Rambiel Oldemabile. Packard Ptymouth Pant or Btudebaher Tecrapians

Includes GATE!

807 car models' New YOU can try Some FREE Offer On MOTOR'S Truck and Tractor Manual

intent Editional Corners EVENY and on his expenses of break fraction stock rogina made from hold thru pages, and uso facts, 2007 pictures. Cherk In enupon.

#### SEND NO MONEY

brand new AUTO REPAIR MANUAL Shows how to save work on ornery jubs, Helps you make MORE

MONEY by doing more jobs in less time! Now covers 1953

models, up-to-date information on

all new gutomatic transmissions, corburators, power steering, stc.

COMPILED FROM 189 OFFICIAL

SHOP MANUALS!

This great book over \$50 BIG 812" x11" pages—brings you the complete dope from 168 Official Shop

Manuala, bound down in simple cut-away photos diagrams, drawings show WHAT to do, HOW to do

Mail coupon below - without money! When your book ar-rives make it show you what it r got/ Unless you agree it a the greatest time and work saver you've ever seen return book in T days, pay nothing Mail coupon NOW! MOTOR Book Department Deak 26 250 West 55th Street, New York 19, W Y,

#### MAIL COUPON NOW FOR 7-DAY FREE TRIAL

MOTOR BOOK DEPT.  Deak 26, 250 W 55th \$t., New York 19, N. Y.  Right to me at once (check heat opens to hook you w  MOTOR B New AUTO REPAIR MANUAL IT O  remit \$1 to 7 days 52 bloombly for 2 bloomble a gayment of Mic 'paus 35c delivery charges) one month Otherwise I will court the bush postpaid in 7 days price remit \$5 cash with order /	M. F will, and a first that after that
16 () K. I will result \$2 in 7 days, and \$2 man translits, plus \$5c defears charges with Sent payment \$ will return book pushmid in 7 days. (Fareign grice, rest with order s	Otherwise
Pytat Name Age	
Address	
City State  Check but and tave 35c delivery charge by motio corpore wit re payment of 25 % for Anto Gente Ma tor Truck and Tractor Repoir Manual.) Same a day rei pric tere applies	noni for III



Lifetime beauty comes out of a gun! Colorcrete is a cementitious plastic, applied by pneumatic premure to new or old concrete, stucco, etc. Tough, tenacious, enduring. Can be washed or scrubbed, Dirty, drab surfaces become sparkling white or tinted from a range of 30 colors.

## Building-Beau

Colorereting is a fascinating and profitable opportunity for men who want to build a substantial, long term business. Colortreting is exclusive. Rich in sales appeal to building owners. Income potentials are high investment is low. We supply complete equipment, full instructions and liberal cooperation. Requires no previous experience or special ability. Write or wire for the Opportunity Book today. Be the first in your community.



COLORCRETE INDUSTRIES, INC. 572 Ottowa Ave., Holland, Mich.

#### "Advanced Techniques of Hypnosis"

new salto in a minima instracted hypometrum books for my a principle profess one hypometrum for new of the test of profess of the product for pulse deep to provide and the formation for a set of the product for pulse on the process of the product formation for pulse of the process of the product formation for the product formation for any of new Appendix on bounds and the proof of the process of the process

for rarning of developmen " Send for Streets) Force Through Sleep Suggestion."

MELVIN POWERS, Menter Hyperdist, 1324 Wishing, Dupt. 162, Hollywood 17 Callt.



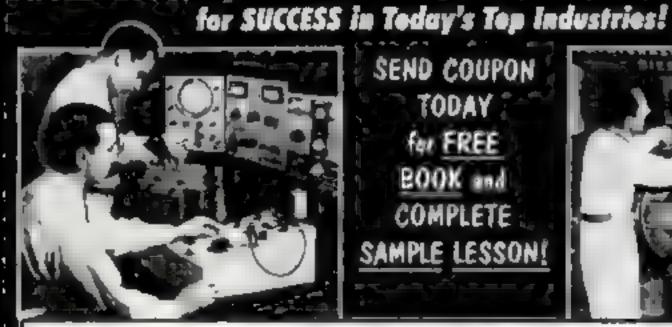
## DON'T YOU

Writing short stories articles on business, eports bobbies, travel, shop crafts local crap and church activities etc. Will enable you to earn exten momes. In your own home, on your until time the New Tork top; Nest Me had traches you how in write the way newspaper more care to writing four us so Writing Apt wile Test' to a whether you present the fundamental qualities easent a lo surcessful writing Tou'll enjoy this seek Write for it, without cost or obligation,

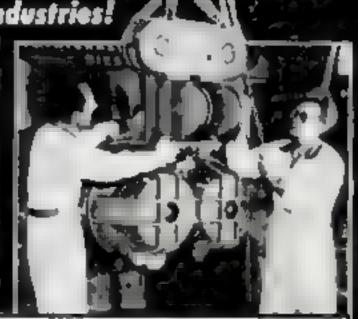
NEWSPAPER INSTITUTE OF AMERICA BUITE 8723-M, ONE PARK AVENUE, NEW YORK 16, M. Y.



## GET SHOP-METHOD HOME TRAINING



SEND COUPON TODAY SAMPLE LESSON!



& ELECTRONICS

RADIO-TELEVISION OR AUTOMOTIVE-DIESEL

& ALLIED MECHANICS

Like a business of your own ... or a good job with a big firm... and get paid for what you know? Shop-Method Home Training in Radio, Television, Electronics will bring you the job. money . you've always wanted 105 million Radios, 3100 stations .16 million TV sets, over 100 TV stations, many more, now Govt restrictions are off Defense industries want trained men for interesting, good pay jobs. Get

into this opportunity-making industry...advance fast. Find out how...mail coupon...TODAY!

I GIVE YOU STANDARD PART INCLUDING TUI

-they are yours to keep. You actually learn by doing, build generators,

receivers, a big Super-Het radio.

THIS PROFESSIONAL FACTORY. MADE MULTI-TESTER IS YOURS!



BOOK &

LESSON I

Valuable equipment every Radio-TV man needs. Yours to teep!

UTO-DIESEL

BOOK A

LESSONI

Both Resident and Home Study Courses Offered

LET NATIONAL SCHOOLS of Les Angeles, California, a Resident Trade School for almost 50 years, train you at home for today's unlimited apportunities. Pick your industry—mail coupon below now!

#### earn extra money while you learn!

I show you how to earn extra money schile icorning! Many men have paid for their entire course in this way. You can, too. Remember Shop · Method Home Training covers every phase of the industry - in an interesting step-by-step way. Why wait-take the first step to succean-mail the coupon today!

DRAFT AGET Training being you get the service branch you want, advance fast.



That means higher pay and grade, more prestige - right away! Don't take a chance mail coupon nose!

Want to be your own boss, , or get into booming industries? 8 million older cars need big, profitable services and repairs. Farm machinery is going Diesel. Defense industry bega for more and more trained mechanics for

high-pay jobs, National Schools Shop-Method Home Training prepares you for all Automotive, Diesel Anied Mechanics opportunities. Helps you get the security, good pay you've always wanted. Send coupon for

your Free Book and Sample Lesson now!

I GIVE YOU THE TOOLS OF YOUR

TRADE! Big professional-quality kit of tools of your trade - and

all-metal tool box. All yours to keep -part of YOUR COURSE: they help make your

training more practical - start you off right!

#### NATIONAL SCHOOLS

LOS ANGELES 37, CALIFORNIA

Technical Trade Training Since 1905 in Conade: 193 East Hastings Street Venceuver 4, 3, C.

APPROVED FOR G. I. TRAINING

DON'T ! PUT IT OFF rig Salary YOU'VE ALWAYS **WANTED!** 

IAIL TODAY-YOU'RE ON YOUR WAY

NATIONAL SCHOOLS, Dept. C-63 4000 S. Figueron Street Los Angeles 37, Celifornia

Mail in envelope or puste on postal pand

I want to "get going" | Send me Free Book I checked and Free Sample Lesson. I understand no salesman will call.

My Puture in Radio-Television & Electronics My Future in Automotive-Dissel & Allied Mechanics

NAME

AGE

ADDRESS.

CITY

第05%

Check here if referred from service tess than 4 years ago

## TIME SAVING TIPS

## DU PONT DUCO CEMENT



CAMERAEXPOSED? Posting leatherette on comeres. binoculars and other equipment can be mended like new with "Duco" Cement.



RIDING A HOBBY? Maybe you make toys, scale models-build 'em for the fun of it. Use fast-drying "Duco" Cement.



LEAKY AQUARIUMS call for quick dependable repairs. A dab of waterproof, transparent "Duco" Coment seels looks easily.



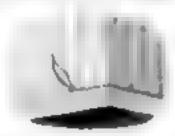
LEAKY TENTS CAR spoll excepting fun. Waterproof, flexible "Duco" Cament mals tiny holes . . . preventa them from enterging.



TORN BASEBALL MITTS can stay in the game longer when leather is repaired with strong, Soxible "Duco" Cement.



Cashaghts will hold fast until they're replaced, when you mend them with transparent "Duco" Cement.



TORN WALLPAPER need not be a household catastrophe. Just mend it neatly, quickly with bendy "Duco" Cement.



REPLACE FELT on busto of candlesticks, vases, and bric-a brac -to protect figish of tables. Use Du Pont "Doco" Cament.







#### J U S T P U B 1 | 1 H Auto Handbook

Actually 2 books in one!

2. Itselds tips by authorities on how to cut gan, oil, maintenance cost, how to drive more safely, simple ways to increase trade-in value.

2. Pictures and lists over 200 parts and accessories selected from nearly 2000 submitted by manufacturers. Some—like a new \$49.50 automatic abift-never before published.

Complete book only 50c postpaid. Money-back guarantee!

MEHREN INDUSTRIES Dent. CS-6 Mehron Obio., Bevorty Hills, Calif.



## A TRUE I. C. S. STORY taken from an actual letter



I was a World War II pilet . . .



A prisoner of war in Germany . . .



Back home, I was hired by National ....



Studied with I. C. S. in my spare time . . . I.C. S. sent reports to my employer . . .



I'VE DOUBLED MY FARNINGS SINCE I BEGAN MY I.C.S. STUDIES . AND I'M GOING TO KEEP RIGHT AT IT.



I am new Washington District Manager,

How have you done since the war? Start now to get the training that leads to advancement. Mail coupon today!



		553-N, SCRANTON T.	PENNA, It the course BEFORE which I have	
ART Commercial Art Magazine and Book Hustraling Carboning Show Gard and Bign Lettering		CIVIL, STRUCTURAL ENGINEERING C Civil Engineering C Structural Engineering C Structural Engineering C Structural Orgiling	Mathematics Commercial Good English MECHANICAL AND SHOP	Stationary Steen Engineers Stationary Fireman RADIO TELEVISION COMMUNICATIONS General Radio Madio Operation
Fashion Ulustrating AUTOMOTIVE Automobile, Mechanic Auto-Elec Technicien Auto Body Rebuilding and Refinishing	Certified Public Accountant Accounting Bookheaping Stanography and Typing Sacretarial Federal Test Bourness Correspondence	C. Highway Engineering  Threading Blauprints  Concrete Construction  Son cary Engineering  DIRAFTING  Arms att Drafting  Architectural Drafting	Mechanical Engineering Industrial Engineering Industrial Supervision Industrial Supervision Industrial Dualting Industrial Dualting Industrial Dualting	C Radio Servicing—FM Television C Electronics D Telephone Work RAL HOAD D occupation Engineer
AVIATION  Aviation  Aftendaries Engineering Jr.  Arcraft Engine Mechanic  Architecture  Architecture	Personnel and Labor Pointiens Advertising Retail Business Management Managing Small Besiness Sales Management	Electrical Original Mechanical Drifting	Machine Shop Practice Tool Design Lindustrial restrumentation Machine Shop inspection Reading Blueplints Toolinahing Lindustrial Welding	Coton Manufacture Carlos Manufacture Carlos Administration Carlos Engineering Cotton Manufacture Revon Manufacture
Arch Drafting Building Contractor Escinating Gerpanier and Mill Week, Corporate: Foreman	CHEMISTRY Chemistry Chemistry Analytical Chemistry	Decircal Engineering     Electrician     Electrician     Electricial Manetenance     Lincipolal Dealling     Electric Pepper and Light	C Sheet Meta Work C Sheet Meta Work C Sheet Meta Work C Sheet Meta Work C Sheet Metal Patients Drafting Delegeration POWER	Woolen Medulacture Loam France Freshing and Oyeing Teather Designing
□ Reading Blooprints □ House Planning □ Planning	Petroleum Mat' Ges Pulp and Paper Making Plastics	C Lineram HIGH SCHOOL High School Subjects	Cambustion Engineering Diesel Electric Dective Light and Parket	YEAR OF THE SIX MILLIONTH STUDENT
Kassa		Ann Home Add	The state of the s	



MORE **OPPORTUNITIES** for **EMPLOYMENT** and PROMOTION

"Here I am at work making good money as a draftsman I'm glad I sent the coupon to Chicago Tech for that Free Trul Lesson and found out how easy it is to learn Draft ing to spare time at home. Today I feel secure in my job because the draftsman's work comes first on any new project, And, in addition, draftsmen can't be replaced with innchines, What's more, I feel I'm slated for promo-tion and more pay, because I see so many draftsmen advancing to high pay Jobs."

#### LEARN IN SPARE TIME—AT HOME!

(or at the Callage in Chicago)

A few hours of pleasant home study every week-that a all. No interference with your present job. All the tools you need; drawing outfit included. With Chicago Tecl. s help, you trass yourself step by step. This tested method -- developed over 48 years of C T.C. progress-prepares neu quickly for good positions in ladustry.



FREE INFORMATION - SEND COUPON

To prove to you how easy it is to learn Drafting at home by the Chicago Tech mathod, we will send you this PREE mathod, we will send you this PREE TRIAL LESSON No charge for this les-you now or after Fill out and mail cou-pon, as send poet card today

#### CHICAGO TECHNICAL COLLEGE

C-221 Toch Bidg., 2000 So, Michigan Ave., Chicago 18, tilinois

Mai, me FREE Lesson with information about big opportunities in DRAFTING.

Name	*****************	
Address		

City . . . . . . . . . . . . . . . . . . Bone . Bute

## INVENTORS

Your first step-if you consider your invention to be something of importance is to have a search made of pertinent, prior U. S. patents. If our search report indicates probable patentability of your invention, you may apply for a patent which gives you the right to exclude others from making, using or selling your invention as claimed for a term of 17

This firm is registered to practice before the U. S. Futent Office and is available to excit in the properation of the necessary drawings, specification and

Ask for a copy of our instructive booklet "Petent Protection for inventors" and our convenient "Evidence of Invention" form. No obligation.

EVANS & Co. Mulin M. Evans 840-G MERLIN BUILDING, WASHINGTON 6, D. C.

## INVENTORS

I shall be pleased to furnish you, upon request, with information relative to patent procedure—without any obligation on your part.

#### PATRICK D. BEAVERS

Registered Patent Attorney

937 Columbian Building, Washington 1, D. C. 

## NVENTORS

PATENT INFORMATION Stock hid

**MYENTOR'S RECORD** without obligation

#### GUSTAVE MILLER

\$3F5 Warner Building Washington 4, O, E.

REGISTERED PATENT ATTORNEY

PATENT ATTORNEY & ADVISOR
U. S. NAVY DEPT. 1930-1947 ASSOCIATE EXAMINER U. S PAT OFF. 1822 1939

PATENT LAWYER

### NVENT

Whether an invention is patentable can be subtrantially de-termined by a search of the U.S. Patent records. Without obligation, write for information explaining the steps you should take to secure a patent.

#### JOHN N. RANDOLPH

Registered Patent Attorney

205 Columbian Building

Washington 1, D. C.





WRITE FOR OUTGEMATION TO

WASHINGTON 1. D. C.



## INVENTIONS

Our elicate have excellent inventions in many fields to be many factured and marketed on a cash suparty of breaker basis. Full description of clients inventions will be sent if you sink your field of interest. INVENTORS: We also want inventions of every type. Write for details

GLOBAL MARKETING SERVICE 1404 Mitchell Street

Dept. FB

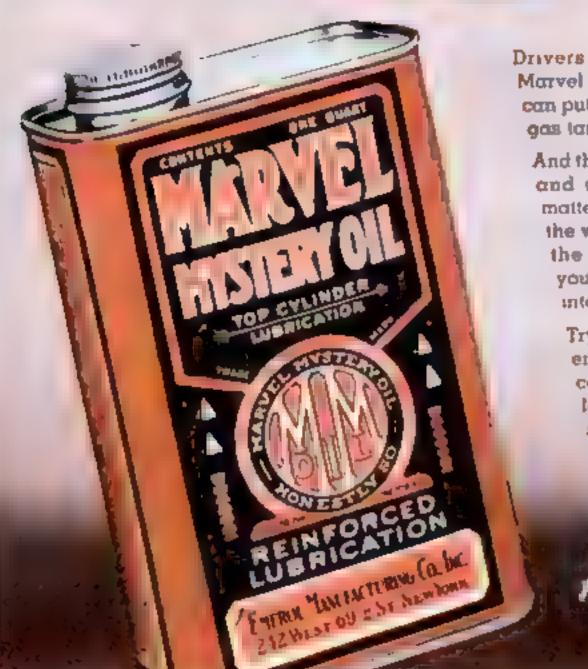
Oaklarid 5, Galif.

IF YOU WISH TO PROTECT YOUR INVEN-TION. You should take steps to protect it by a U. S. Palent. Write me for "INVENTION RECORD" FORM

- CARL MILLER

WOOLWORTH BLOG., 35th FLOOR, 43C. NEW YORK CITY

# NEW CARS NEW LONGER... USED CARS IN USE LONGER.

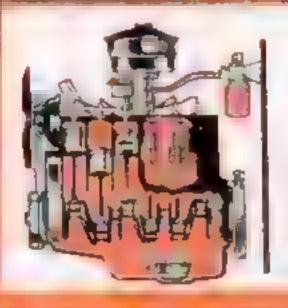


Drivers in the know. . know Marvel is the finest lubricant you can put into your crankcase and aas tank.

And that goes for both new cars and used cars. Age doesn't matter. What does matter is the way Marvel registers — in the lower service charges you shell out at inspection intervals

Try a can of Marvel in your engine today. See if your car doesn't run better, longer . . . right from the start!

MARVEL MYSTERY OF THE MECHANIC'S CHOICE FOR THIRTY YEARS



Motived in the crankerse lays a strong, heat-resistant film of all on all moving party alliminates hydroute valve claritat provides ring sent circuit, roots and protects bearings and villal upper cylender request. The car runs for many store engine must per dollar

Install a Marvel Inverse Giler for direct labrication to the boart of the angine. Feeds in direct proportion in horsepower curve through provered ratio to manifold varyous. No other other works on this principle? Fully adjustable. Easy to install Fully quaranteed.

For more information, write:

Pept. 100, 242 W. 69th St., New York 23, N. T.







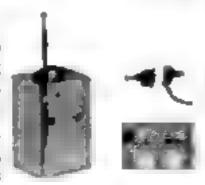
KIMBUT PORYAMIA KANDA KIT

Build this powerful 3-way super-het portable for AC, DC or hattery operation. Tunes 535-1650 ke broadcast band, has built-in antenns, PM speaker, handsome carrying case. Easy to assemble from illustrated mannal High-quality kit includes all parts, tubes and case (less batteries) Shpg. wt., 6 lbs.

83-730. Only..... 514,75 Battery Kit ...... ....\$ 3.44

#### PHILMORI KADIO CONTROL KIT

Build your own remote-control transmitter and receiver! Operates model airplance, boats, autos, etc. Crystal-controlled transmitter for 27,255 mc. (requires easily ob-tained FCC operating permit) High-gain receiver. Easy to build. Complete with all parts, antanna, crystal and cabinet; less batteries. 



BARGAIN TY BOOSTER

Precision designed printed-circuit TV booster—at less than half original price. Gives uniform gain on all 12 VHF TV channels. Essy to tune improves reception. For 110-120 v., 50 cy. AC. 4 lbs. 97-223. While they last, only..... \$9.98

#### MOTER BOTESTHE SOME

Equeens the trigger—you solder in 5 seconds! Latest heavy-duty instant-heat gun; with 2 spotlights that light up working area. Aircooled transformer, 834 lbs.

46-642. 250 watte, single-heat, only. \$ 9.75 46-645. 200-275 w., dual-heat, only. \$13.71



#### MICRO-YOX WIRELESS MICROPHONE

Mike with built-in midget radio transmitter plays magically (without wires) through any radio within 50 feet. Easy to use for home entertainment or as small P.A. system. Provides andless amusement. Complete with built-in batteries and instructions. 3 lbs.

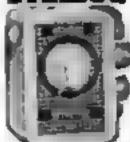
#### FREE Catalogs

ALLIED RADIO CORP., Dept. 7-5-3 833 W. Juckson Blvd., Chicago 7, Ill.

- D 6wnd FREE Catalog and Supplement
- ☐ Enter order for....

Address

## N WANTE



Make \$15-\$20 in Few Hours Spare Time—up to \$2100 a Week FULL TIME — with Amazing D-FROST-O-MATIC!

Millions of housewives want this sensational new Automatic Refrigerator Defroster! No more messy hand defrosting! Just plug in D-FROST-O-MATIC and refrigerator is defroated disto-

natically every night! Saleneasy, sure when you leave D-FROST-O-MATIC on FREE TRIAL -- bounewives won't let you take it out! Saves money, food, tyme, work! Big profits for you—up to \$210.00 a week full time-\$15 to \$20 in just a few spare bours! Start spare time and build big, prosperous business . , , quickly, easily!

SELLY of California started in ble apare time and now sells 1500 D. Frost-

O-Mattes &

month?

Rush Name Today for Profit Details and FREE TRIAL PLANS

More than 28,000,000 prospects waiting? Rush your name and address today. We'll airmail exciting facts proof and sure-profit Free Trial pian. No obligation. Write today.

D-FROST-O-MATIC, Dept. C-14

#### ANIMALS, FISH, PETS Is a fee growt bace y air by to may I to I HOLDEY can be had to present the Fig. 18 Sept. 19 by the property of the prope REE BOOK T A T WARDT IN THE BOOK SELECTION OF THE PROPERTY. proper set a time a St SD STATE TOUR AGE.

#### RAFT CATALOG

SCHOOL OF TAXIDERMY, Dept. 2606

POSTAL



)20 PAGIS ... Craft Supplies, Tools, Designs, Instruction Books from America's Largest, Most Complete Handcraft Stock.

Send for your free copy NOW!

**GRIFFIN CRAFT SUPPLIES** 

5626-\$ Telegroph Ave. \* Oakland 9, Col. I.

Train quickly to 6 short weeks at Toleda for a bright future with necurity in the vival month but been ling pay ful time jobs HAVE A PROPERTIES MARKET OF YOUR ROYS. Pay after graduation Diploma given, Job help Township of surveying granules. Our 28th

PERF SCHOOL SCHOOL OF MEAT CUTTING, Copt 51 B Toleda 4, Ohio

#### NEW WONDER LUBRICANT!

Increases Life of Your Engine Gives More Power . . . More Pep!



#### ENGIN-MOLY CONCENTRATE

With Full Treatment of Melybdenum (MoS2)

1 Qt. Can \$1.29 FEO. TAX

In complete suspension—flutes every frictional surface of your engine with millions of microscopic "boll-bootings" which prevent "dry storts."

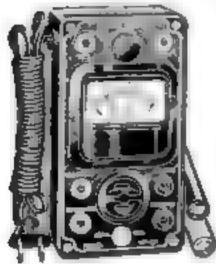
Sold by all Automotive Stores, Gorages, and Service Stations

#### COLUMBIA-BEDFOND COMP.

Ent. 1889

New York 4, N. Y.

## for repairing ELECTRICAL APPLIANCES-MOTORS



Model 50 UTILITY TESTER — A new kind of instrument for testing ALL electrical circuits and utilities such as — Thermostats, Lamps, Tubes, Fluorescents, Solenoids, All Fuses, Condensers, Field Coils, Heaters, Circuit Breakers, Fans, Washers, Soldering Irons, Melting Pots, Air-Conditioners, Ballasts, Lighting Systems, Electric Ovens.

ALSO — ALL MOTORS — single phase, multi-phase, universal, squirrel cage, induction, in fact every type of motor from fractional H, P, to 2 H, P.

Measures A.C. and D.C. Voltages, A.C. and D.C. Current, Resistances, etc. Will measure the current consumption while the appliance

under test is in operation. The appliance or unitity may be plugged directly into the front panel receptacle. A special pair of insulated clip-end leads is included for motors, etc. Incorporates a sensitive direct-rending resistance range which will accurately measure all resistances commonly used in electrical appliances, motors, etc. This range will enable continuity checks and tests for shorts and opens.

Compact-Measures 3/4" x 51/4" x 21/4".

Model 50 comes boused in round cornered molded bakelite case. Complete with all test leads and operating instructions—only

\$13°0



## for repairing AUTOMOBILES — TRUCKS

Medel 60 AUTOMOTIVE TESTER

Designed to test the complete electrical systems of automobiles, trucks, busses and bonts. The ranges were selected to give maximum service on both 6 and 12 volt battery systems, Measures exact current consumption at any point. Reads direct in ampores. Incorporates direct-reading resistance range which will accurately measure all resistances commonly used in the electrical circuits of all battery-powered automotive equipment. Sensitive leakage indicator for tracing and locating cause of trouble in the ignition goil and firing circuits.

The Model 60 Automotive Tester will test storage batteries under load — ALSO Generators, Directional Signals. Oil, Gasoline and Temperature Gauges, Field Coils, Circuit Breakers, Fuses, Cut-Outs, Magnetos, Distributors, Horns, Relays, Armatures, Vibrators, Cigarette Lighters, Solenoids used in overdrive systems, Ignition Coils, Lamps, Regulators, Brushes, Condensers, Clocks, Electric Heating Systems, Spark and glow plugs, etc.

Model 60 comes complete with all test leads and operating instructions. Only

**513**90

## for repairing RADIOS — TELEVISION



JUNIOR SUPER-METER -Measures:
A.C AND D.C. VOLTAGES = CURRENT = RESISTANCE = CAPACITY = REACTANCE = INDUCTANCE = DECIBELS.

Plus: Good-bad scale for checking the quality of Electrolytic condensers. Specifications:

D. C. Volts: 0-7:5/75/150/750/1500 V. A. C. Volts: 0-15/150/300/1500/3000 V. Resistances: 0-10,000/100,000 ohms. 0-10 Megohms.

D. C. Current: 0-7,5/75 Ma. 0-7,5 amperes.

Reactance: 15 ohms—25 K ohms. 15 K ohms.—2,5 Megohms.

Inductance: .5 Henry-50 Henries. 30 Henries -10K. Henries.

Decibels: — 10 Db to + 18 Db; + 10 Db to + 38 Db; + 38 Db to + 58 Db.

Electrolytic Leakage: Reads quality of electrolytics at 150 Volt test potential.

Compact—Measures 314" x 514" x 214".

The Junior Super-Meter comes housed in a round-cornered molded bakelite case complete with test leads and all operating instructions. Only

\$21<sup>40</sup>

## SOLD ON EASY PAYMENTS AT THE NET CASH PRICE

## NO INTEREST OR CARRYING CHARGES ADDED

Here is your opportunity to buy test equipment on easy payments at the net cash price. If not completely satisfied after trying for 10 days, return to us, no explanation necessary.

MOSS ELECTRONIC DISTRIBUTING CO., INC. Dept. 8 59, 38 Murray Street, New York 7, N. Y.

Freuse send me the units checked. I am enclosing order and agree to pay the monthly balance as shown. It is understood that there will be no carrying interest or any Other charges provided 1 send my monthly payments when doe. It is further understood that abould I fall to make payment when due the full unpaid belance shall become immediately due and payable,

- Modet 30 UTILITY FAMILIE, Total Price \$12.90 E3.90 down payment, Halance \$2.00 monthly for 5 months.
- Model 80 AUTOMOTIVE TESTER
  Total Price \$13.90
  \$2.90 down payment, Balance \$2.90 monthly for
  5 months.
- UNIOR SUPER-METER . .. Total Price \$21.40 to 40 down payment. Balance \$4.00 monthly for 4 monthly.

7	BUILDING.								
1	enclose	+		•	-	. 4	22	down.	payment

Signature	 	 	
Nome _	 	 	
Address	 		
			la.



Breet Western Tailoring Co., Dept. P. 837 West Jackson Sival., Chicago 7, III.

Rush details of sensational 1-PRICE LINE, including free sales kit and sample line.

Name

Addrew.

Assemble & Install Suckeye Screen & Glass Combination STORM WINDOWS

- B Shipped Knocked-Down. Chass & Serven • Thausands Sold.

 Redwood ar Aluminum. Finant Quality

Punels Interchangeab e Summer er Wigter

Make up to \$10 00 an hour SPARE TIME assembling Buckeye Storm Windows. Sell year found-no stack period Quick, pary to assem ble A sound, legitimate business. You risk nothing; no tools to buy; no big stock needed We're 20 year-aid company, A 1 financially

56.65 For Redwood Storm Window to ht 25 ; a M 5" plone facero & glass not includent

Yes Pay Duly

Some Attractive Bealer Territories Still Open-Weitel

THA FINANCING THROUGH YOUR BANK Hunkeye Storm Windows rate by fittanced on \$25.4 Plan. Add them is may home for as first as \$5.00 a month. No does norment. See your burk

SCREEN & WEATHERSTRIP BUCKEYE Street, Columbus,

U. S. Patents No. 2,351,906 No. 2,461,872

## Save Fingers

#### Steel-Grip Finger Guards Lower Your Plant Protection Cost

Hundreds of factories save time and injuries by protecting workers with Steel-Grip Open End Finger Guards. For handling rough, sharp articles, buffing, granding, sending, punch press work, and hundreds of other jobs. Protect fingers or thumbs, front or back, from cuts, abrasions of blisters. Various designs in leathers and other materials: electic web back for snug, cool, comfortable fit. Sires for men and women. Send 10¢ for sample. Catalog of Salety Apparel Free.

INDUSTRIAL GLOVES COMPANY
A Corporation

1426 Carffold St., Danville, Iti. (In Caseda, Salety Supply Co., Yotonio)

FAMOUS INDUSTRIAL SAFEQUARDS SINCE 1918



In only 6% manths we can proper you to enter this rapidly growing BIG PAY field No previous experience or special training necessary. We help you find full or part-time jobs while trushing. But, 1836. Vasaran Approved.

regad 198s brade Mark





Con 36. Studio 6

## OR PRINTS Your Transpa<u>ren</u>cies

Detrott 24 Mich .....

Electronically controlled for superb results. Rapid service and satisfaction guaranteed. Prints from | ANSCO COLOR

any size KODACHROME transparency EKTACHROME  $4 \times 5$ 5 x 7 8 a 10 12

71

50°

PROCESSING: ANSCO & EKTACHROME 24 hours— Rolf Film 120-620, 15 mm, 20 ex m/d. . . . Only \$1.00 roll

COLORFAX LABORATORIES (MIT 2-02 MIX 2521) Made 7, B.C.



Kensington Station

MONTH AFTER MONTH, YEAR AFTER YEAR YOU SEE OUR AD. CHECK AND DOUBLECHECK BEFORE YOU BUY ANYWHERE! Are These Tires "Famity-Sale?" Our Families Use Them.
Are They Recapt. (Or New Treads' Recapt.) Tours are Mut.
Will I Get Goodyear & Other Famous Brands' From Us—Yes.
In The Guarantee "Unconditional"? See Our Fine Offers Selem.
Can Good Tires Be Bought Cheaper? 10's Congress To Pay Less. Most Miles Per Dollar Make Out Tires Cost Less! GOOD/YEAR Our Policy is to select your tires so carefully as if our very future depended on the service given by that particular tire. FREE TUBE WITH EVERY GOOD & BE WISE BE CONVINCED GOOD SUPER GRADE, 20 MOS. GUARANTEE BOND 18 33 44 670 18 \$4 24 600 20 \$6 74 750 20 \$6 18 4 24 710 15 \$4 44 650 20 7 34 525 70 \$1 10 4 84 760 15 \$4.74 700 20 8.24 900 30 \$1 11 3,54 500 15 \$04 3746 44 \$3 24 500 20 \$1 11 4.14 820 15 \$1.14 3276 84 \$4 41 100 20 \$1 600-16 650-16 700-16 650-18 700-15 6.14|820 15 3.14|3216 " 5 84|1100-20 13 84
FINEST PREMIUM GRADE JO MOS GOLDEN BULE CUAR 80/00
THESE MADE THE BLATT NAME WORLD FAMOUS"
600-14 55 14|640-15 14 84| JO MONTH GUAR TRUCK THREE
650-16 5 44|650 15 5 14| 27HA VALUE XTRA MILEAGE
630-16(| 8 64|670-18 8 04|700-15 0) 10 94|17:8 | 511 84
700-16 5 34|710-15 5 54|750-15 10 44|3216 (0) 13 24
700-16 0) 7 84|760-18 3 74|750-16 9 14|473 JO 17 84
750-16 6 84|800-13 6 84|700-16 9 14|473 JO 17 84
850-16 84|800-15 6 84|700-16 15 84|900-20 16 24
900-16 17 4 34|700-15 5,84|650-20 8 94|1000-20 16 24
Whitewalls 11 44|ERF\*\* 700-10 10 44|1000-22 17 24
Deluge Whitewalls 37 Extra 750-10 10 44|1000-22 17 24 700-15 YOU GET WHAT MUD GRAP FREAD WE ADVERTISE 52d Guar 20Mos RuggedGuar 32Mo 750 20 dist 44 /20-20 g 516 04 600 16-pt 11 94 900 16-pt 15 74 600 16-pt 1 94 900 16-pt 6 94 T PLATT \$100 GIRARD & LANCASTER AVES
DEPT PS, PHILADELPHIA SI, PA,
ST CHICK OR MONEY DIDER & THE ST BLATT



Thousands Of Shipments Rushed North East South, West, F O.S. Phile.

#### FREE TEST REVEALS YOUR

Write for fest-and bookiet "Art for Pleasure and Prolit " Both free Prove your ability in commercial art, cartooning, tellaring-at home. Send postcard stating name, age, address



Washington School of Art., Studio 136 K., Washington 5, 9, C.

## SHORTHAND eedwriting

#### **HOW TO WORK WITH PLASTICS** ... AND WHERE TO BUY

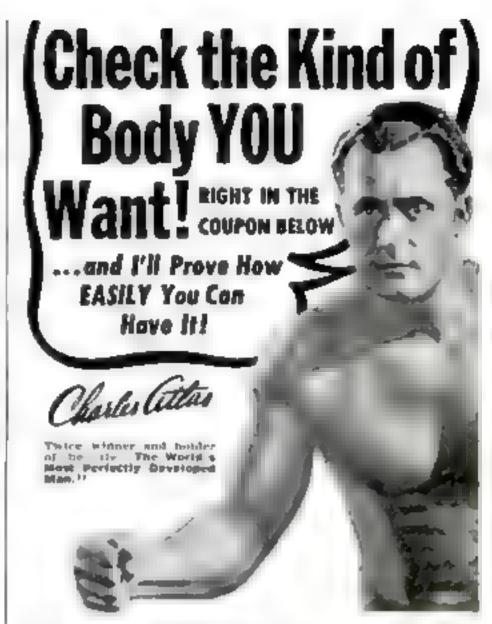


Over 100 pages packed with practical plastics facts materials equipment supplied Thelades actual samples manual with charts, definitions preperties of plastics and the latest infor matten on this amazing pew hold Pean, the mos complete catang of all lynes of plastics materials and sugblies ever offered. A must for everyone interested in plastics - hobbyists - in-

dustry modelers schools, ric Blow to cast laminate and labracate ail plastics for both fun and profit Money back Guarantee if Postpaid returned within 7 days.

FRY PLASTICS CO.

Dept. S-6 7826 S. Vermont Ave., Los Angeles 44, Calif.



JUST (cl) me where you want it-and I it add SOLID INCHES of powerful muscle SO FAST your friends will grew bug eyed with wonder I'll PROVE you can be a new pan in just If minutes a day in your own home. It won troot you a penny'

I myself used to be a 97-15 weaking. Men caded e. Skinny "Gir's nade for of no THEN I discovered my great new pascle-bailding systemnamic Tenson It turned me date such a specimen of MANROOD But toshy I had the the THE WORLD SMOST PERFECTLY DEVELOPED MAN."

"Dynamic Tensi in ' is the easy NATURAL method THE A DAY while your riest and shoulder it sactes began to swell those arms and legs of yours and your whole body starts to feel "alive, fulf of zip and go'

#### FREE My 32-Page Hustrated Book Just Mail the Coupon

Send NOW for my Ismous book "Ever lusting Health and Strength 32 pages, parked with photographs valuable advice showers many vital questions. This IT send you a copy absoluters FLEE Just ganging through it may change your life Rush coupon to the personal a CHARLES ATLAS, Dept. 18. 23rd St., New York 10, N. Y.



#### CHARLES ATLAS, Dept. 16 115 East 23rd St., New York 10, N. Y.

Dear Charles Atlas: Here's the Kind of Body I want. (Cheek as many as you iskn).

- More weight—Salid—in The Right Places
- T Preserval Arms and Grap " Stimmer Warst and Hips " Strong Lap Muscles

STATE

- Brander Chest and Shouldera
- Better Sleep, Mara Energy

Send me absolutely FRS F a city of votal failures book. Ever desting the h and at engine to the order or med with philipselphic abswers to a lampable apparation and suitable makele. I understand this book to more in keep and sending for at does not obligate me to any way

NAME

tplease print or write plainty)

ADDRESS

CITE

TOOL DESIGNERS . TOOL PLANNERS PATTERNMAKERS+TOOL&DIEMAKERS JIG & FIXTURE BUILDERS • MACHINISTS

Here's your

Convair, builders of world-famed Convair Liners, military aircraft, guided missiles, needs tool designers, tool planners, pattern makers, tool & die makers, jig & fixture builders, machinists, template makers.

Excellent working conditions: Here's your great apportunity to work in a modern plant on long-range projects at excellent wages. Top-notch retirement plan. Fine health and life insurance.

Wonderful California living: San Diego offers you and your family incomparable living, ideal climate. Sports aplenty. Beaches, bays, mountains, desett, Mexico and Pacific Ocean surround you. Plenty of good housing - reasonable rents, it's a new way of life — pleasant, refreshing, hoppy

Sand coupon new for free booklet, "You and Convoir" plus your application form. Travel expense to San Diego paid if you Quality,

H. E. Pasak, Employment Manager Conveir, 3302 Pacific Hiway, San Diego, Calif., Dept. PS-42 Please send me FREE "You and Convair" and my application form:

NAME \_\_

OCCUPATION.

AUC II

## JUST PUSH VALVE ... OUT COMES LATHER! AERO · Richer, Creamier Lather No Brush Needed No Greasy Cream 3 Beard Softeners Suilt-in Lano-Lation

#### SPARE TIME AT HOME

Now you gate enjoy the big apportunities open to skilled draftsmen. C.E.I. training, under liyou too training. Profit by industries grow-ing, deparate need. Thou-

CITASTYMA

INDINITIONS.

SHIPTUTE . SHALL sands have succeeded with a C E I. diploma. So con YOU! Get full inlermation today! Just write your name and address on a Sc postcard.



CLEVELAND ENGINEERING INSTITUTE Extension Division PS&C 6300 Buchd Ave , Cleveland 3, Ohio

FREE MONEY MAKING FACTS

Non-you can care how in tagge high matery to reaching treatments of perfect transports book chain to arrive my matery to X I, runtier module.

NO EXPERIENCE, VERY LITTLE CAPITAL NEEDED. A ran her Pt. of a Que 54 OF post-age en tax. Made and crowth rether arthree monds of a prompo siend the re unded has border for all unmative to pages describing to a wobKUGE

ARTS STUDIO 2403 S. MADIBON, DEPT. 3

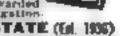
#### ASOPE PHOTO-ENGRAVING PLANTS



OF THE CASE THE SELENA PERS Establish your own profitable PHOTO-EN-GEAVING business. Make cuts for newspapers, printers, and advertisers. Make etched name plates, plagues etc. Instructions furnished, no experience necessory. Sold direct from foctory since 3931. First five hundred cuts sold locally or by mail will pay for plant and pay you well for your time. Write for FREE catalog.

TASOPE DEPT PS-4, AURORA, MO

PAYS SIG! SEND FOR PARE, BIG. ILLUS-TRATED CATALOG NOW! Graduages report making substantial incomes, Start and run your own business quickly. Men, witness of all ages, jearn easily, Course covers Sales, Property jearn easily, Course govers Salva, Property Management, Appeals of Loans Mortgages, and related subjects STUDY AT MOME or in class from in leading cities. Diploma awanted Write Tittay for free books No religation. TELLS



BOOK

WEAVER SCHOOL OF REAL ESTATE (Ed. 1996)

#### PLA!

NO MORE SHAME-FEAR! Be happler. At case in any sec a, group, Use the right words - of the right time. Get shead faster, with this proven easily-mastered course Plain, English saves emberrasement, Helps you overcome business and social handicaps?

FIRST LESSON FREE - No Obligation Bend for it new. FAMINATING atmphs tounist FREE Must be serv 21. Send post on it or write MONE STUDIES HIGHNAITED, Wilhort Bldg., Diet. #5, Springhold 4, Mo.



## Complete PUMPING UNIT with MOTOR

Ready for Usel Regularly \$28.75

Tremendeus buy for form, home, shop and garden. PUMP\$ 1,500 GALLONS PER HOUR 5 FF. HIGH!

A powerful to HP motor, 110 voits, to do 1 out suction and tifting jobs. Drains or late wash tube. waste water o overhead sewers etc. place waste water to exemple sewers etc up to 15 ft 2 gh. Have puncing water system 12 - water from well to upper floors and gaves garden. Water 12 h Royal pumping the mean from feet off 10 h de ere with the flow 18 h Mindel stille. Seeprems seed keeps tooms from leaking dylach any 2 granden hour. Attache and operate to 1 for me investment of real value flatigation guaranteed of the 12 h Mindel Safet Limited supply Order NUML WE PAY POSTAGE. up to 15 ft 1 gh. Bave

Send for FREE CATALOD MORENTS ELECTRIC CO., Dept. 66, 249 W. Srand, Chicago 22, (IL



request Shipped tame day Menny bath guarantee Dealer inquiries childed ORDER NDW' SEND CASH, CHECK OR MONEY

Manufactured and distributed by

ORDER.



SMALLEST .22 AUTOMATIC \$37.50

determs for P. h. Automa e using at Safetit car trages Save present a Pocks a punch basy to eath the tighs a one present as Pocks a punch basy to eath the tighs a one of a shape tragent that the trace of the overal file overal file overal file overal file overal architecture which the determinant of the month of a contract of the overal stage of the overal of a contract of the overal overal overal of the overal overal



## BECOME A Mechanical Engineer



#### B. S. Degree in 36 months



50% of the nation's industrial leaders started their careers with engineering training Today, young men like you are being urged to prepare for careers in these rapidly expand-

ing fields. Nine separate programs give you a wide range of career opportunities.

#### -Choose From These Courses-

ENGINEERING 36 months, Bachelor of Science Degree

. eptienal year 'round study

Mechanical Engineering with a major in Design, Metal Fabr cation or

Plant Engineer ng.

■ Electrical Engineering with a major in Electronics or Power.

TECHNICIAN 1216 18 months

- Rodio and Television
- Electron cr
- Electrical Power
- Mechanical
- Air Conditioning
- Welding

General preparatory course -- 3 months

#### SERVICE & to 12 months

- · Rodio
- Welding
- A Ondere
- · Heating
- · E ectricity
- Refrigeration
   Tolevision

#### Terms open July, October, January, April

Faculty of specialists, 50,000 former students. Annual enrollment from 48 states and 23 overseas countries, Approved for Veterans. Your Military, Practical or Academic training evaluated for advanced credit. Send coupon for complete information

#### MILWAUKEE SCHOOL OF ENGINEERING

SOTH YEAR . NON-PROFIT

Dept PS-653, 1025 N. Mily Milwookee 1, Wisconsin	raukėė	14	<b>Q</b>
"Your Career" book et Free 100 page false ig I am also interested in	DATE:	e of sour	
Name			Age some
Address a a			's mar
	Zobe	- Sante	



## **BE YOUR OWN USIC TEA**

You Can Learn Piane, Suitar, Accordion, ANY Instrument This EASY A-B-C Way

NOW IT'S EASY to learn music at home. No tresome "exercises." No teacher, just tiresome "exercises." No teacher, just START RIGHT OUT playing simple pieces. Thousands now play who never thought they could Our pictured lessons make it easy as A 8-C to learn to play popular music hymns, classical and any other music Only a few cents a lesson, Over 900 000 students! (Our 55th successful year.)

FREE BOOK and LESSON-SAMPLE

Find out why our method can teach you quickly, early, inexpensively, Write for Free Book and Free Lesson-Sample. No obligation. Mention your favorite instrument,

Just Mail Coupon below U. S. SCHOOL OF MUSIC STUDIO CLIM PORT WASHINGTON, N. Y.

W. S. SCHOOL OF MUSIC, Studio C156, Port Washington, N. Y. Please send me Free Studies and Lesson Sample 5 would like to play a Name Institutions

Instrument

ffave you Instrument7

Saliciona

Name

(Please Print)



Smooth On No. 1 Iron Cement applied to your loose hinges, door handles, cont books, drawer pulls, knobs, casters, bathroom fixtures, tool and cutlery handles, will tighten them and krep them tight. . Get Smooth-Oa No. 1 in 1% oz., 7 oz., 1 lb. or larger states at your hardware store. If they haven't it, write us.

## EE Repair Handbook

40 pages, 140 illustrations. Shows you how to make numerous bousehold repairs quickly and easily. Directions are simple, brief. 60' \$47

SMOOTH-ON MFG. CO., Dopt, KEF 570 Communipew Ave., Jersey City 4, N. J.

Lead of the State THE IRON REPAIR CEMENT OF MANY USES





DAA N WASH TUBS CELLARS, C STERNS IRRIGATE-FILL TANKS-DRAW WELL WATER ( , she get 75 h ; 1 M 1 Wa 895 IANUFACTURING CO.

Learn Short-Cut Mathematics

augg on a constructing hum or to run Make works pray at your mare on I give by used mind at a figure of the party of the construction of the party o Sharpen up Your Brain Power

Incendes we are to preliment at every side Bones, some bargain only \$2.05 postpard or COD plus postone is not an end or reland Green, but
and by Shretalun Mellema on today.

NELSON-HALL CO., 211 S Close SL Chicago 6. III. Campleto

#### STUDY TO BE A DOCTOR of Psychology or Metaphysics

Obtain a Po D Mo D or Ph D degree. Bu a Teacher Lecturer of Accredited Pract Coner Teach others how to achieve Health. Happiness and Contratment, Chartered by State. Write for FLEE book training how

THE NEOTARIAN FELLOWSHIP

Deak 6, Pickwick Building

Kansas City 4, Missouri



Men afflicted with Bladder Trouble, Getting Up Nights, Pains in Back, Hips, Legs, Nervousness. Dizziness, Physical Inability and General Impotency send for our amazing FREE BOOK that

tells how you may correct these conditions and have new health and Zest in Life. Write today No Obligation. Excels or Institute, Dept. 8-5, Excelsion Springs, Me

BEST THOROUGH, PRACTICAL TRAINING IN THESE DEPENDABLE, HIGH-PAYING TRADES. Earn extra money so you learn, repairing clocks and watches, or engraving silver and jewelry. YOU WILL BE BUILDING YOUR OWN BUSINESS RIGHT AT HOME.

#### MAKE IT YOURSELF VEST-POCKET RADIO

WORLD'S SMALLEST

2-TUBE RECEIVER

- Only 21/4" wide, 34/4" toll,
   1" thick
- A real radio—not a tay
- · Up to 1500 mile range at night \* Bullt-In loop-stick antonna
- 2 Egytheen sub-ministure tubes—the kind used in \$200 hearing-aids
- Tune is at work or play— ANYWHERE
- Hearing-ald serset lesures BUANCA
- Full step by step instructions. \* Large clear picture plans



mreme can a

A real miniature portable radio for indoor or outdoor use. Enjoy while on comping trips, at the office, or in bed with-out disturbing others among your friends with this tiny package of electronic magic—no antenna for local reception. Anyone from Radio Hobbylat to amateur can assemble this fully finished pre-fab kil in a single evening. Complete set including two real Raytheon tubes only \$7.95 postpaid Batteries \$1.75 per set or obtain from local hearing aid store. Use any encishone or hearing-aid carsel-will supply at wholesale cost. Order today while special supply of Raytheon tubes is available. SATISFACTION GUARAN-TEED.

BLECTROMIC MINIATURES

"Ploncer manufacturers of miniature electronic equipment". BEAVERDAM, YIRGINIA

## NEW V.B.L: MACHI GIVES YOU 55000 FOR SPARE TIME

#### OST THE EXTRA INCOME YOU NEED THIS QUICK WAT AT NOME

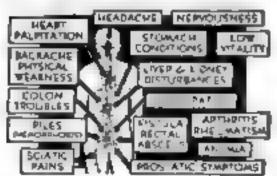
There is life Minky to the amount over business of cleaning Venetian is fold under mass production method with new parented Venet in finish Launoucing Mach he flumes hately offices, institutions five you there builds to reak resulting Machine bringing 50 100 to \$1 Mi Oi for spare evening hours ha a ngle week \$1 MO a month shift more to full time one store. No super once present town ones and lets you pay as you give, Wille for smaller facts at once.

VENETIAN BLIND LAUNDRY EQUIPMENT CO. WICHITA 13, Hangag Gept 12-M



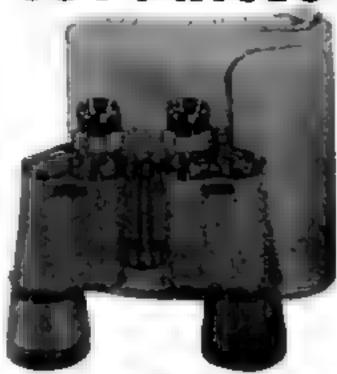
#### Fistula May Often Result From Piles

FREE BOOK - Gives Facts On Associated Ailments



A new, illustrated 40-page book on Flatula, Rectal Abscess Piles and other rectal and colon disorders is now FREE to all sufferers. Write today a card will do. Thorston & Minor Hospital, Suita 649, 911 III Linwood, Kansas City 9 Mo.

## DOK Precision Binoculars at



#### Coated · Prismatic · Color Balanced

16 x 50 mm nn 50

LOOKI 10 x 50 mm COATED A N 95

#### Absolute MONEY BACK Guarantee!

Look to old reliable Thorseen a for the Shorulors of deep cut prices.

Every bibers are I also to COATED ACKROMATIC and PRISMATIC!

Best of all they are FOCUS BALANCED, a Thorseen feature that
goes en system seeming will how one ying aberra one All base pig

shin or one call correspondence & 2 straps. We driv ANY competitor

to match the law to or tree.

to mater this length or letter	
NOTE - ALL PRICES FULLY TAX PAID-MOTE	
A H LAND A LAND AND A LAND A L	33.95
Tan PAID	33.53
0 7 x 30 mm Contat Facus (No. 153)	39.85
	36.63
# 2 x 15 mm Wate Angle U traffic (conted)	59.95
Tas PAID	77.77
4 A x 30 mm Center Focus (No. 146)	38.50
	Charles Charles
20 X Telescope Light Pocket share	8.65
POWERFUL*	9.43
Bend check or money order for quick prepaid do livery &	

post a Pay Money Back Quaranteet Who pur more? Buy the Thoresen a way and BAVE!

352 Fourth Avenue Dont. 7-F-500

## GERMAN PRECISION PISTOL

Six Shot Repeater AUTOMATIC

re- emion egainst o Eht prowlers! Prevision made in the bigh traditions of become guarrate brace dimensions. On h and design of death death and no number on Liste on y 33 calharm.ess thanks Specially designed chamber gives for the percussion audible at entitions of stances enough to trible magnetic dispugites our of any character. Substitute magnetic magnetic elegities ejected an umarically Safety catch. Cothon steel cubstraint on dispute Constant handle has no tee permit needed. Pistol on y 9 65.

Carridges available everywhere Send check or to a for immediate Money-back guarantee

THORESEN'S

352 Fourth Avenue, Dept. 7-F-111, New York 10.



Reading This Message Could Be the Most Important 40 Seconds In Your Life

From every indication Auto Body and Fender Repair work will continue to be fie of America's Rig Income fields, Here at UEL we're truin ng men for it - a proven plen that combines spare-time, home study and actua, shop practice. Men from coast to coast have successfully completed the l' E I, course in Auto Body

and Fender Repair - many earned money while learning - many now have their own shaps. What about you? Isn't this the time for you to see what this big-pay field offers you? Do this: Mail the coupus below and we'll send you our big, descriptive book, "Opportunities," It's Free — Mail the Coupon.

UTILITIES ENGINEERING INSTITUTE, Chicago 14, Minois Founded 1927

WILLITER ENGINEERING INSTITUTE.

2523 Shoffield Ave., Bupt. XM-22, Chicago 14, Hilinois

Please send, Free, Tour Book "Opportunities".

NAME (print) .....AGE ....

ADDRESS ......

CITY, .... (Zone) ... STATE ... Check here for information if you are under 17



### Vacation Loads and Rough Roads

Air Lifts, the sensational Pneumatic Spring Boosters, are perfect to equip your car for safe and comfactable driving with recation loads.

Whether you houl a trailer or load your vacation needs in your car, you'll always enjoy a level, safely balanced rids with Air Lifts in the rear to assist your regular springs. They adjust with air to suit your exact loading requirements.

Air Lifts are also available to install in your front springs for improved dependoble steering.



See your dealer today or write to:

AIR LIFT CO.

2330 West Main Street LANSING, MICHIGAN

#### SUCCESS . BIG PAY in Aviation

#### MASTER A&E MECHANICS

urgently needed

Maximum training in minimum time! Thorough, practical instruction backed by more than 25 years of aviation technical experience. Training authorixed under G.I. Bill.

Write teday1 **Hustrated Cotalog** Repistrar, Dept. 91. Miemi 30, Florida



RAIN IN MIANI - AIR CAPITAL OF THE WORLD

Learn to apply this tremendous POWER, Develop will-power, sett-confidence, self-control ANYONE con moster this exciting prefitable prefession in short time by training at home, with GUAHANTEED RESULTS. DON'T DELAY . . . Write to America's eldest Hypnotic school for free information naw-today!

> INSTITUTE OF APPLIED HYPNOLOGY Dept. 26, 120 Central Park So., N. Y. 19, N. Y.

#### Build a power mower with the STEEL Whirlmor cutting unit

eve wheels

Bond for Free o Budio Mistind hat Spotage

Flows or nester u 15: 10: 30 Steel State - Cary to Baness for maching, a Blade Height Early Adjusted

It's Everesteed

GANADO MF6. CO. Bez 626 • Genedo, Texas

#### \$2.95 EACH OR 2 FOR \$5.00!



Upright Telephone complete with cord in Tested and Guaranteed condition. For Inter-communication or extension. Complete list of telephone parts, inter-communication sels, switchboards, bindsets, magneto and dial telephones, etc. Write for list. F.O.B. Suppon, Pa. C.O.D. Shipments accepted.

TELEPHONE ENGINEERING CO.

DEPT. C.

SIMPSON, PA.

## make your own Gents information and hierature

The Gem Maker comes complete with all necesthe sem water comes contains with the pership et a present for uding a super charged diamond
blade for saving and at whe to for grinding shoping and pointing a su complete sarruntions. The
complete equipment he shown has motor
and be to for only \$29.50 for both and
took. The compacts were coday for

Doot. B Burlington, Wis.

DRIVING COMFORT at its best! The New ELECTRIC THROTTLE

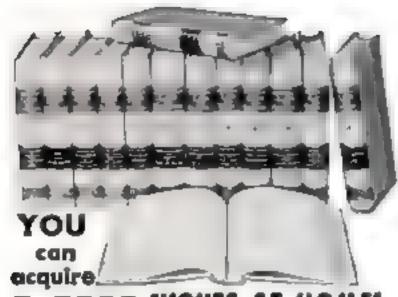
The electric throthe ( Speed selector sets whatever shood sturchouse electrically releases merand) at a touch on the the har do not by any and back strain for mod! In-a' of a set of Price \$17.50. Fill 2. Check or Cill be Several state franchises open. Bealer inquities invited file and year Pays for itself in most and year Pays for itself in most pe as ngs.

WRITE POR DETAILS

With Foot Control

WRITE FOR DETAILS

D & M MFG. (ORP., Dept. P-1, Anderson, Ind.



# LAW NIGHTS AT HOME!

Legally trained mee win higher continue and hugger surface in business and public life Greater appartunities now than ever before.

More Ablity: More Prestige: Mere Meesty shap by also you do you tan train at home during spare time. Destroy of L. H. We furnish all lest material including to rounce Law Laboury Low root may be true Get after remarks of page. Law Training for Londwidge and Evidence books Fitch Send N.I.W.

LASALLE EXTENSION DESTRUCT, 417 South Boorborn Street A Coursepondence Institution Dept. 2014. Chicago 5, M.

# . BREID STROPICAL FISH ".

Opportunity. No experience. No expensive equipment needed. SOME SELL FOR \$75 PAIR AND MORE! Fascinating! Beautiful! Entertaining! We supply everything. Make Big Money spare-time at home.

FREE Writes TROPICAL FLEM BREEDERS OF AMERICA.

Dept. C-0 Line Angeles 15, Conformer

SESSIONS SWOW

Give your age and, IF HOBBYIST tist your equipment if any.

# LEARN TV-RADIO Servicing HATELY

RARN WHILE YOU LEARN! No previous tracting needed New simplified leasons with complete parts kits Build your own TV set One of the largest schools of its kind Approved for Korean vets Amo Respect to Course Cay & eve classes Send for FREE sample leasons and full details on a problemle thrilling except Write today to Dept As

CRESCENT SCHOOL

FIREARMS & SWORDS

You don't went to mass our new thrill packed catalog Place nating background and theatrations of 1300 authentic places Exceptions values in hard to-find items. For your 120 page catalog 228 simply send 50c to cover postage and head ing with your game and address.

HOBERT ABELS, Box P3, 840 Lexington Ave., New York 21, M. Y.

BOOST YOUR INCOME WITH THE

the Model 300 Ideal I awamower Sharpener.
I ned not recommended by leading manufacturers and service shops,
the Ideal has everything you need, nothing else to buyterinds reet and bed knife,
also reconditions Get started
now in this highly profitable
husiness. Write for cutalog
today.

extra cash with

The FATE ROOT-HEATH Co

# Keeps hair in place - leaves no trace!



AT LAST, a hair groom that keeps your hair neat, well-groomed, good-looking, and yet never leaves a tell-tale trace! Change today to Mennen Cream Hair Oil. It's lightly blended to groom hair, but never grease it. Contains lanolin. Helps remove dandruff scales and relieve dry scalp. Economical, too. Get a bottle today!

# MENNEN CREAM HAIR OIL

## MANUFACTURE WITHOUT TOOLS OR MACHINER

We believe this is one of the most astonishing and important offers ever made to ambitious penpre everywhere .. because we TEACH YOU and actually show you how to make the most remark shie, the most anusual line of heautiful and use-ful things of ENOLESS VARIETY with easymany paralbilities for PROFIT and PLEASURE!

## NO SPECIAL ABILITY REQUIRED!

No provious experience of the la, ab lip is required! NO TOOLS OR MACHINERY are required . the saire process to about to case to nauring water and of a stand The WONDERS OF LIQUID PLASTICS make all this possible!

## UNLIMITED POSSIBILITIES!

Work with LIQUID IVORY, LIQUID CLASS, LIQUID MARBLE, LIQUID EBONY, LIQUID PORCELAIN LIQUID WOOD LIQUID SEMSTONE and many other LIQUID PLASTICS and at a leaster of many et turn them not an studiess and valued to procession of beautiful imtodas jewelts have tex apaqueties stellers bookenasi lampa pensera lighters, aslugays her chains, figuration curion nonvenirs, art and gift print arts for a ures boats BADGETS galare exquisite GEMSI Make grave, tools dire, forms fanules, dials, knobs, WACHINE PARTS mod plant inventions protol grips , the first is end east. The only LIMITATION is your IMAGINATION;

### WE SUPPLY EVERYTHING

We supply everything the muterials, the ideas and the free investions! If you have the need of the desire to make any of the products men through abuse and counters others, as well as your own pet godget or intention, then take adrantage of our remarkable materials and unusual process and tass great offer today. The possibilities for passeure and profit are practically notice to

## VALUABLE BOOK GIVEN!

Just send 35e and we will send you our book HOW TO MANUFACTURE WITHOUT TOOLS OR MACHINERY, We will also send you our but 41 page carried describing all the materials men loned above. Do it today we want you to share in these wonderful opportunities as seen as possible?

PLASTICAST CO., (Dept. A) P.O. Box 6727 Street on P.O. Sest 867 Chicago 60, 111, pither address; Pala Alto, Calif.



LENES



PEN SETS



MAMBLES ENGYES - DIALS



STATUES FIGUUIAES



LE M.S.



ENGINEER

IN 27 MONTHS

Bludy Engineering in this world-famed school Established 1884. Osmand for our graduates exceeds supply. Approved

for Kornun Velt. Burbular af Berunen Dagran in Machanicul, Civil, Electrical, Chemical. Aeronautical. Radio (Television) Engineering, Business Administration and Accounting Afre-36 weeks pertificate courses in Surveying and Graft ny.

Persons and Instruct on Asselsrated sources. Non-essentiate eliminated For ambitious, except students. Earn your de-gree in the shortest possible time. Preparatory courant, Placement service

Extensive Comput Well equipped, new and buildings up to date table Lew cost New terms start quartorly. Enter June, Bestember, January, March.

Mail Coupon Today

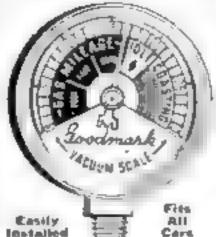
# TRI-STATE COLLEGE

\$43 College Avenue, Angele, Indiana Please send me free Catalog and Special Information, 4 am particularly interested in courses as theched:

Television) T Electrical T Chemical (T Accounting Chemical [] Aeronantical Shari Diplome Courses

Address

# Here's how You can save money!



NEW! GAS SAVER AND MOTOR TUNE-UP GAUGE

Here's the newest, improv procision quality instrument that shows the condition of your car's meter at a glance! Accurate . . . Pays for Itself in gas savings, instructions tune-up chart included.

> SATISFACTION OR MONEY BACK

495 ORDER COMPLETE POST PAID

21 E. 2nd St., Dept. A36 DAYTON 1. OHIO



# CONTINENTAL Red Seal GAS ENGINE

**NEW**, in factory pucked cartons Can be need for Lawn Move-ers from Compression, ted craters, and can be adapted for many other sector purposes.

Madet AC 6 1 MP 3000RPM Afregoret tryese Since Calimier Shipping Weight 42 his

Priso \$25,08 F D H New York No G.O.D.

\* COLUMBO TRADING CO., Inc., 383 Canal St., New York 13, N. Y. \* ------------

# \$5,000 Te \$10,000 YEARLY Raising CHINCHILLAS!

TOR EAST THEM - WE ANY THEM !

Send no money - write TODAY for free booklet ... real success stories of folks everywhere who make fabulous profits raising these valuable animals.

MAYIONAL CHINCHILLAS RICHMAN . FULLERTON 18 CALL

Thousands of Parts in Stock. Send for 1953 Hustrated Catalog, - \$1.00 WE ALSO BUY GUNS FOR CASH \*\*\*\*\*

SHELLEY DRAVERMAN 20707 East 31 Street, New York 16, N. Y

# Get the thrill of building your own Crystal Radio, It's fun and it's easy, With Allen's

newly developed type FD 500 permanently fixed crystal detector you don't have to adjust crystal, Illustrated instructions and plans for building your own crystal Radio with newly developed fixed crystal with warranty guarantee All for only \$1.00 postpaid. Rush your order today. ALVA ALLEN RADIO, Dupt. PS-16, Clinton, Missouri

EGOLAN

# POWER MOWERS



Sails your own quality

Engines Free Plans guide you, 2 and 6 When Kits, complete.

Parts precision finished ready to use Write TODAY for Free Plans, Low Prices, Parts List and Gustabios



gine Latest improved features. described in coops folder TRIANGLE MANUFACTURING CO., Box 5-22, Fort Scott, Konson

pin ely assembled in 3 and 4 where models Bell or offect drive 18" and 21" acres Nat halo shows make en



## GIANT BALLOONS

Weather target hallooms for FUN or PROFAT Great apert in the backyard. Or for part as picture dances fairs MOMET MARGINE Like the re hallongs to allege especial to cover events. Contentions exhibitions trade shows TERRIFIC for high school and rolling PROMA. Special purchase makes these low orders possible.

3 ft, dat, 49c-6 ft, die, 79c 13 H. die. \$1.59-20 fr. die. \$1.95

"Markemen"

# AIR PISTOL

fit's a target pistol but (t lunks feets, mustle touts and the sike an arm) 45 % gran base fun indicers to rumpus room or basement or out in the back yard or would. Make thirtes, of shift and out-

pawered guaranteed Complete with free supply of Bill . \$5.95

## EXTRA AMMUNITION AVAILABLE

Doris, \$0c des .- BB's, 15c for 150--Pallets, \$1.50 for 500

And 10% for hundring & determine of the placed four contents please will color too on 41 true

ASSETS DIV. YOLUME SALES CO.

Boot 5-6-53

ghyded

are little go

3930 Sunset Sive.

Los Angeles 29, Catif.



TAMBLYN SCHOOL aI PENMANSHIP 5, A. Ellier, Pres. 436 Midge Stdg., Sannes City, Ma., Will.

care or perenny speed with an instructoreach the finder Telegroup Code Teacher that takes as place of an operator instructor and each on a tions to master code without further seated an the lights Talestonic force in and embed in the lights for an except the rode, with the lights the part of an except the rode, with the lights for a content of the lights for a content the lights for any factor of the lights for a content of the lights for any factor of the li

INSTRUCTOGRAPH COMPANY 4701 - P Shoridan Road, Chicago 40, Illinois



# FUN TO DO ... PROFITABLE TOO!

Textile Painting . Shellcraft Beadcraft - Metal Tooling Lamp Shade Making

Sand for BIG. FREE Catalog Today !



Other Crafts

Complete supplies, averything you need

KIT KRAFT, Bept. 34-1373 Metrace Ave., Hellywood 46, Caint.

# Kidney Slow-Down May Bring **Restless Nights**

When kidney function slows down, many folks complain of nagging backache, headaches dizziness and loss of pep and energy. Don't suffer restless nights with these discomforts if reduced kidney function is getting you down—due to such common causes as stress and strain, over-exertion or exposure to cold. Minor bladder irritations due to cold or wrong diet may cause getting up nights or frequent passages.

Don't neglect your kidneys if these conditions bother you. Try Doan's Pills-a mild diuretic. Used successfully by mil-Bons for over 50 years. It's amazing how many times Doan's give happy relief from these discomforts—help the 15 miles of kidney tubes and filters flushout waste. Get Doan's Pilistoday i

# 1800

This Big Practical Book gives full informatton with working diagrams dovering the principles, construction, ignition, service and repair of modern cars, trucks and buses.

Diesal Engines, Hydramatic & Floid Orives Fully Explained.

A complete Guide of 1800 pages, with over 1500 lilustrations showing inside views of working parts, with instructions for service Jobs.

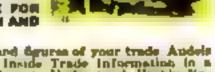
## IT PAYS TO KNOW

How to fit pistons-How to locate engine knocks, How to fit connecting rod bearings - How to service main bearlings - How to recondition valves - How to

time valves-How to adjust fan belts-How to adjust carburetors and chokes, How

to rebuild a clutch - How to service automatic transmissions - How to service brakes - How to adjust steering gear - How to cope with Lenition troubles - How to service distributors. How to time ignition-How to "tune up" an engine

COMPLETE - PAY \$1 A MO. TO GET THIS ASSISTANCE FOR MAIL COUPON TODAY.



Step up your own shift with the facts and figures of your trade Audels Mechanics Guides contain Practical Inside Trade Information in Handy Form Pully illustrated and Easy to Understand, Highly Kndorsed Check the book you want for 7 DAYS PREE EXAMINATION.

Bend No Money Nothing to pay postman.

Please send me postpate for PRES EXAMINATION books teached & beton | 1 ) tected to hoop them | parce to mak \$1 to 7 Days on each book or set ordered and burther man \$2 monthly on each book or not would



PAGES

# Check NOWI

You Can Look Over Any Guide In Your Own Home

Stort the Ever Parments If Satisfied

TODAY

7	e paid price, pilerwise i will return flows.
ы	AUTOMOBILE MECHANICS GUIDE, 1200 Pages STRUCK & TRACTOR GUIDE, 1299 Pages DIESEL ENGIRE MANUAL, 575 Pages MACHINISTS HANDY BOOK, 1650 Pages WELDERS GU.DE, 400 Pages DLUE PRINT READING, 416 Pages MATHEMATICS & CALCULATIONS, 700 Pages SHEET METAL PATTERN LAYOUTS, 1100 Pages SHEET METAL WORKERS HANDY BOOK, 388 Pgs. HECHANICAL DRAWING GUIDE, 160 Pages MECHANICAL DRAWING GUIDE, 160 Pages MECHANICAL DRAWING & DESIGN, 440 Pages MECHANICAL DRAWING & DESIGN & PAGES MECHANICAL DRAWING & PAGES M
8	TRUCK & TRACTOR GUIDE, 1299 PARSE
Я	DIESEL ENGLISE MANUAL 675 Pages
8	MACHINISTS HANDY BOOK 1650 Pages
ч	WELDERS GUIDE 400 Pages
	BUILD PRINT PEARING ALS PAGES
ы	MATHEMATICS & CALCIN ATIONS, 200 Pages
И	CHEET METAL PATTERN LAVOURS 1500 Pages
М	SHEET METAL WOOMERS HANDY BOOK TREPOL
Ы	MECHANICAL GRAWING GIVINE 160 Pages
ч	COMMICAL ORAWING & DESIGN AND PAGE
=	PERSONAL MUNICIPAL STATES OF STATES
4	PROPERTY WORKER, AND PARTY
븻	REDURANT CHIEF OIL Bears
믯	CLECTORNIC DEVICES THE PARTY.
y	ELECTRONIC DEVICES, 216 Falls ,
Ų	ELECTRIC MOLON GUIDE, 1000 Paper
丩	ELECTRIC MINING DIVENAMO SAS LABOR
Ų	RADIOMANS GJIDE 914 Pages ELECTRONIC DEVICES, 216 Pages ELECTRIC MOTOR GUIDE, 1000 Pages ELECTRIC WIRING DIAGRAMS 272 Pages ELECTRICIANS EXAMINATIONS 250 Pages ELECTRIC POWER CALCULATIONS, 425 Pages
딕	FIEGURIC PUREK CALCULATIONS, 425 Falles
9	HANDT BOOK OF EFFCURICITY, Tean Lafes .
	ELECTRIC DICTIONARY TOOD FORMS
	EFECERIC FIRMWAY 1000 ANDIO (15 ROOF 201) 1
ų	MARINE ENGINEERS MANUT BOOK, 1230 Pgs
0	ELECTRIC POWER CALCULATIONS, 425 Pages HANDY BOOK OF ELECTRICITY, 1440 Pages ELECTRIC DICTIONARY 1000 Terms ELECTRIC POWER 125 Pages SHIPFITTERS HANDY 1000 Terms ELECTRIC POWER 125 Pages HANDY BOOK, 1250 Pages ELECTRIC POWER 1250 Pages ELECTRIC POWER 1250 Pages ELECTRIC POWER 1250 Pages ELECTRIC POWER 1250 Pages ELECTRIC DICTIONARY 1000 Terms ELECTRIC POWER 1250 Pages ELECTRIC DICTIONARY 1000 Terms ELECTRIC DICTIO
	REFRIGERATION & AN CONDINUNING LZOU PAS
	MILLWRIGHTS & MECHANICS GUIDE, 1700 PEL
9	POWER PLANT ENGINEERS BUIDE, 1500 Pages
Ċ.	ENGINEERS & FIREMANS EXAMS, 525 Pages
c	PUMPS, Hydraulies & Air Compressors, 1658 Pgs ENGINEERS LIBRARY (3 Book Set) MECHANICAL DICTIONARY, 950 Pages
	ENGINEERS LIBRARY (3 Book Set)
Ċ	MECHANICAL DICTIONARY, 950 Pages
	CARDENERS & GROWERS GUIDES (4 Book Set)
O	CARPENTERS & BUILDERS GUIDES 4 Book Set.
	PLUMBERS & Steamfitters Guides (4 Book Sel)
Ö	MASONS AND BUILDERS GUIDES (4 Book Set)
Ó	PLUMBERS & Steamfilters Guides (4 Book Set) MASONS AND BUILDERS GUIDES (4 Book Set) PAINTERS & DECORATORS MANUAL, 450 Pgs.
П	HOUSE HEATING GLIDE, 1900 Pages
Ö	GIL BURNER GUIDE, 384 Pages

Marrie,	 	
444ress	 	
-	 	
Employed by		RE





# PIERCE LONG RANGE

# Universal Governor

 Instant variable speed selection and necyrate engine control at any speed setting within 1200 to 2600 RPM. Higher and lower ranges. obtainable by simple change of pulley. Also "constant speed" operation.

 Accurate dependable speed control for angines operating corn shellers, drag lines, horsts, are welders, trucks and tractors with power take-offs, etc.

Weile for Complete Information

DEALERSHIPS AVAILABLE

THE PIERCE GOVERNOR CO., Inc.

\*\*World's Most "1 Experienced Severnor Municipal participant of the control of the control

1654 Ohio Avenue, Box 1000 Anderson, indiana, U. S. A.

Pulley extra

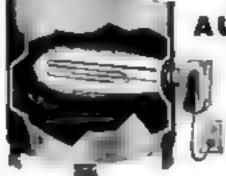
Send Check or

Money Order.

State Meles,

Model of engine.

New Low Cost Electric Water Heater Gives You



oto-Ready to \$19.95

HOT WATER

No diet grime, saut, flame! BAFE! Every part UL approved?

install in 10 Minutes, or less? No new tanks or plumbing remuszed .

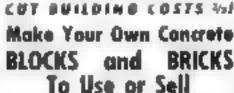
Works automatically-naves on funt blatte

New th approved LECTHOMATIC changes gas roat or as butteng water beaver into modern All-Ed El TRIC go if Turns on auto-maticular when needed shalls of

Remove plus from water tank Acres I Et THOMATIC into open ng ar shown then Pill 6 35 and 11 1 and At cas of these 1256 water flebty of hot water at day tong to a on y to the electricity per gas of hot water Temp admitable from 1001 to 1801 degrees Save postage Send check it money order for \$10.05 how Motory back in ten da > 10 but delighed Full upp year guarantee ORDER NOW Dept

COLLOID FOUITMENT Co. Inc.

MEW YORM T, N Y



New superior moulds make absolutely quare true easy-to-lay blocks which wi pass any building code Production is fast easy One durable 630 machine will make four 5"x8"x12" oth per minute-1 000 a day Pays tasti in one day Sell bucks for a printing or save 3, building cost yourself POST CARD BRINGS HEE FOLDER

ECONOMY MFG. CO. STONE MOUNTAIN, GA.

-BIG JOBS AT TOP PAY Ears to \$125 as a TV service man! Over 20,000 john

waiting new- 100,000 by 1955 CT i trans you at home. You build tend keep) a 17-in, receiver, Parts sent Free job placement. Write for valuable booklet.

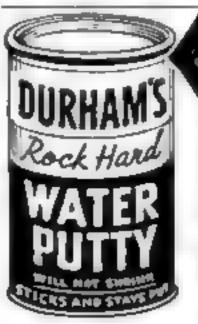
COMMERCIAL TRADES INSTITUTE, Dept. 71-6 1400 Greenlast Avenue



Learn Lechamirhing and Reymaking from Experts in Your Spare Time at Home! the or physical handscap no disastronings. Yearbound steady throune in this perinates , tilopered ded Fud of part time Practical, Illustrated presons show you have to make maney even white rea hing! Als major als and apople) tools su blied Send for FULE BOOK, IT

LOCKEMITHING INSTITUTE Dept. P842 Retherford N. J. 16 Park Ave. ha Stair of W J.

Buy U. S. Defense Bonds



The Modern PLASTIC TOY lasting Home Repairs

PERMANENTLY mends cracks or holes in wood, tile, stone or plaster. Sticks and stays put -Does not chip abrink or fall out, Easy to use Economical Mold it, chisel it polish or paint it. If unobtainable from your tomber, paint or hardware dealer, the lug 4-16 can wal be sent you post paid ( n U 5. ) for only \$1.23. Full money-back guarantee, order now.

DONALD DURHAM CO. 363 School St., Dos Maines, Jawa



EYELET PLIERS - 1000 uses in home crafts. Sets metal eyelets in canvas, leather, paper, etc. The eyelet plier has an adjustable gauge that locates the eyelets in the center of beits, etc. 300 gift eyelets included; only \$3.98 Postpaid. EXTRA 1000 brass eyelets, assorted colors-\$1.50. Newark Dress Supply Co., Dept. G, 671 Broad St., Newark 2, N. J.

Concrete to ARTS AND SCHENCES: Ph. meophy Education Letters, Public Hearth Medical Jur gradence Phychology Secures, Physics theoristry Leonogy Pol Science This logs Law Humans and connecte Accounting Mathematics Statistics Agriculars. and outbrove Accounting Mathematica Statistics Agriculture. ENGINEERING: Electrical Dist. Mechanical Deafting Architectura Heart District Accountical Radio Structura Moning Industrial, Perishum Refrageration, Air Conditioning, Chemical, Send for fren egintog.

McKinley-Recoverett Incorporated, 4618-A3, Shorldon Rd., Chicago 40, Illinois

# Maly Bring Greaks to Justice Three CRIME DETECTION!

We have tought thousands this exciting profits a pleasant profession let us couch you in your own bone. Learn Florest Printing Freezes Identification. But of Pastography Secret Beruse Methods thereughts, quickly at small cost ther total at American Bureaus of Identification employ I A S students of graduates. We can prepare you for this few not by work do not space, one. We be today Mating age, for B us Book of terms !!

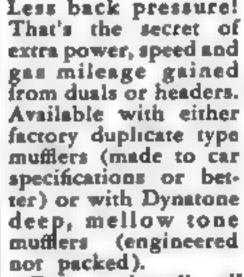
INSTITUTE OF APPLIED SCIENCE, 1828 Suppyride Ave., Dept. 136 A.Chicogo etc. III.







Factory Duplicate OF DYNATONE Deep, Mellow Tone Mufflers



Easy to install-sil parts and illustrated instructions are included. Made to permit use of heat riser butterfly. Exhaust pipes have adjustable or beaded and sized for MEADERS rigid flanges and are trouble-free Installation. Tail pipe ends bent to angle of original equipment for balanced appearance. Available for most V-8 engines.

BUALS

See your dealer or write for details.



The Dynatone Multier—with the Deep Mellow Tone—is also Available for Single Installation

# GOERLICH'S

619 Smith St., Dapt. 8-F, Telede 1, Ohio





Get yours now! Get quick, sure "split second" starts for your car or truck-every time-in any weather! This Stewart-Warner Electric Fuel Pump feeds a steady flow of fuel to your carburetor the second you turn on the ignition. Operates independently of the engine. Saves your battery, Saves you from the trouble and embarrassment of a car that dies at every stop.

Casy to install. Takes only minutes. Do it yourself or see your local Carburetor Shop or Service Garage.

Precision Built by

# STEWART-WARNER

Instrument Division, Dept. P-63 1840 Diversey Farkway \* Chicago 14, IK.

Sensettenal

What a collection! Includes Albania Liberation, showing P D R and Chur chill, Monace, Pupe P unit and a Great Britain. War Propaganta Heats, United Matters, first stance leaved plus dozens of other unusual stamps and seld from all over the world. Grand total -- 108 stamps. Catalog value, \$2.50.





Famous Accusé-the-World Stame Album - contains 2196 illustrations; apares for 2012 stemps from 253 rountrien, philutoile maps, etc., etc.

# of STAMP COLLECTING

Charleful of helpful hints on the world's most exclaing hobby - how to began, where to get atomps pius Stamp lifent flor-plus Stamp Dietionary plus scores of terrific bargains'

Year Just 25e brings you ALL I everything you need to start your own valuable stamp collection and have hours and days of fun and pleasure! It's a regular \$2.75 value-yours for only 25; to introduce our Bargain Approvals. BEND 25¢ TODAY.



ZENITH CO., Dept. EH-10 81 Willoughby St., Brooklyn 1, N. Y.



# \$5 per hour

Clean and Matherest rugs and uphelstery 'in the home ' or public buildings if how employed, you can opings if now employed, you can op-erate in spare time and by it up a permanent profitable full time busihour's grown profit on service they renuer and \$5 on EACH of their wife at National Price Guide charges.

Jears quickly established.

DURACLEAN elema by absorptions No scrube setting or shrinkage. Durt and grease matted pale rises. . colors revive. nge used again tome day.

DURAFFOOF resists motifs and curpet beetles. hard backed by a National Money Back the Warring

sh enough material to return your total Tel. in Bend for FREE bookjet TODAY

DURACLEAN CO. 3-166 Duraclass Eldg.

Courfield, 111.



Dept. P-63 RUGERS MFG. CO.

# to the fauncies of the World the Q t.'s buggest little herp-And a

Therein as the control of the confidence in a street of the confidence of the confid - Fulde Flat . . . File Key Bing cach

KAUFMANN ARMY NAVY 310 W 42nd St., New York 36





No descial tools or skilt necessary Can be mounted in window or attic

C. 1000

30 Bize

\$15.5

Sith contain Pan apider Masonite bades. Rubber mounted bearings.
Shaft Pultrys Bell Bolts and In structions Tou furnish lumber and everage foods affice, and, etc.), \$14.95 pg. Honoy-back guarances Order today and keep cool this number limings distantish anipment Brochure free PAN MIT CO., 154-C ND. BELVEDERS, MEMPHIE, TENNESSES



Write now for free booklet and pictures of supture care. You can be helped...work steady, with low cost, easy to wear Web Trues, thousands satisfied.

Boot. PS-6. Hagurstown, Maryland

Pays you more with a schooling at Parks College, B.S. degree in 3 yrs. from Saint Louis University-Aero, Eng., Maint. Eng., Aero Administration.

Non-credit courses for Private, Commercial, Instrument, Flight Instructor and Multi-Engine Ratings, Also A & E Mechanics Course.

All Parks schooling approved for G.I. training. Write laday.

DEPT. \$-61 ARKS COLLEGE EAST ST. LOUIS, ILL.

# MY GRAY HAIR IS NATURAL AGAIN

says Jan Garber,

Idol of the Airlanes

'No matter what color your hair was before it turned grey (black, brown, honde or red) TOP SECRET will restere that color " says famous dance band leader Jan Garber 'I noticed resuits after just a few applications. And



TOP BECRET is easy to use—doesn't stain hands or scalp. I look years younger. And TOP SECRET keeps my hair looking lustrous and well groomed. It's the only hair dressing I use."

## YOU LOOK YEARS YOUNGER

TOP SECRET has been a favorite with famous personallties for years. Exclusive TOP SECRET formula imparts natural color to grey or faded hair. Does not atreak or injure hair Not a tint.



Start using TOP SECRET today, Bend 33.00 (Fed, Tax Incl.) for 6 os. bottle. Postpaid. No COD's, please, Money back if you're not delighted with results.

> ALBIN OF CALIFORNIA Room 40, 1401-99 W. Oth St. Los Angeles 17, California

# Finish HIGH SCHOOL HOME

Complete 4 Yrs. Win 12 Months

Learn Marel Earn Marel Enter professional or technical schools. Advance Socially, give a Heppier, Fuller Life. Individual Courses or complete schadule. WRITE FOR SCHOOL BULLETIM.

ACADEMY FOR ADULTS 30 W. Washington, Dept. P6 85. Chicago 2

# PHOTO COLORING RETOUCHING AIRBRUSHING

By one of America's foremost magazine and national advertining artists. A specialized field with a scarcity of good photo retouchers Men and women making \$5 000 to \$25 000 a year Avail yourself of a rare opportunity to participate in a course by mail of this profitable profession WHITE

PROFESSIONAL ART INSTITUTE
DEPT. PS-4, 56531/2 HOLLYWOOD BLVD., HOLLYWOOD 28, CALIF.



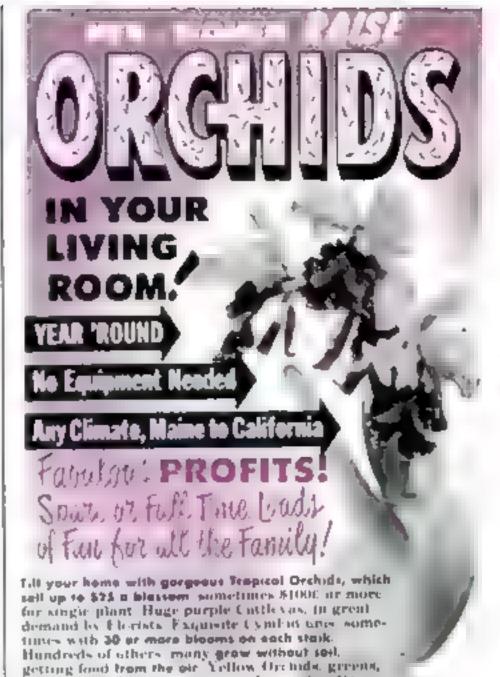
Largest supply in New England, fiftings — Biveprints - Books, All prices, Write Dept. PS\$3. BIG ILLUSTRATED CATALOG ...... 25c

> address locas for complete details | Die Free Spengie Outfit cents as 150 netus. Westernwit-PROGRESS TAILORING CO , Bept. X-720 100 S. Throop St., Chicago J, Minois

JAMES BLISS & CO., INC.

342 Atlantic Ave., Coston 10, Matt. 25 Years in Sucinett







# Successful Home Grower SHDWS YOU HOW!

Louis Schlemer Deart of L. S. Occhid Growers, shows you stop by step how he and Mrs. Schlemer started with a low plants at home developed a big-profit business and grew an Orchid on lection now worth a fortune base haw Orchida mobiply above one plant may eventually become bandeeds, each so a stantile my the first. No big anvestment.

LOGIS SCHIRMER - Orchidist

blues punks browns, every rambow cafor No.

equipment meeded. Start up eard table in your flyings

No overhead. Takes few minutes a week. Hig profit orders come from loderiduals Borists, butels, c'ube, ele Popular yese mund gift Million is liby hall-Order Schirmet shows you have



Complete Directions - secrety of the un-

perty-to sample language, Jam-packed with "show how deswings, gorgeous full-culor pictures of Orchids. Also Cart-Red, health; Orchid Plants (attleys, Cymhidium, Epidendrum - from the Scharmer's own transcens, tverything out home, without rish tree, Full details.

Learn how you may become an Orchid Grawer. Send so messyl Write Inday. Airmell is quickent. Topopies I Topopies TROPICAL FLOWERLAND Dept.

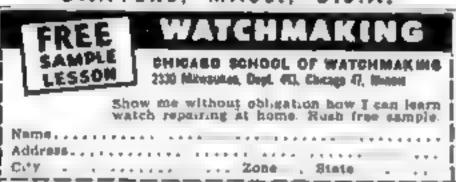


Tempical Plannerland Dept. "J 801 S. Vermont Ave., Los Angeles & Calif. Higsh me complete Phit details on your offer of Louis Schumer's Instructions which show me how to grow Tropical Orchids at home. The instructions will include tiving Orchid Plants and valuable home Profit Plan. This does not ubligate use in any way-

Name			
Address	 		
Chr	Zone	State	



DANVERS, MASS., U.S.A.



# Invisible Gloves Protect Against Grease, Grime, Paint

Just rub on Du Pont PRO-TEK hand cream before you start dirty lobs. You'll be wenting invisible gloves. When the job is done, washoffthe PRQ-TEK. Dirt, grease, paint wash off with lit Leaves hands soft.



stain-free. Get PRO-TEK for about 49¢ at drug, hardware, auto supply stores.

# DU PONT PRO-TEK



Setter Things for Setter Living Mrough Chemistry



# SENSATIONAL -OPTICAL BARGAINS



A BRAND NEW IDEA! COMBINATION SOX MICROSCOPE AND 10X TELESCOPE, Amazingly practical and spetal, turry it right in your packet has convenient haiding clip. The 50 power discreerope to earth focused by thing alightly. A broom the objective lens then for all the the examiner on inspect on line remove metal cap are draw and all log (the for focusing electrics in the ported from much at a cargain office t bronte and black Botch Length closed " d a 11 to"

Stack No. 30,059-N \$4.80 Pestpoid

SIMPLE LENS KITS "Include minimp wer en, i untraced hook et les them cases in photograph and or dozen of other uses a repertmental optic to id on to Lie to 1995. Sont paper Microscopies etc.

Brock #2-N-10 tentes Funtfaced bank et

5 1.00 postpald 5 00 postpald 10.00 postpald Stock # 10-N 80 Jenses

Order By Stock No. We have Literally M I loss of War Supplies Langes and in one for Sale a Carpa a Paper Also number on Types of Instruments Including any price Institute a Carpa of Matter and With the Carpa Exp. ATALOG N

EDMUND SCIENTIFIC CORP., Barrington, N. J.



30 lb, set. \$ 8 46 | 150 lb, set \$28.48 300 lb, set . 13.98 | 200 lb, set 25.98 Write for Order by Math. Some with order that C O D or Cotalog Stee was the north but I' the plant

DAN LURIE BARBELL CO. 1701-50 Fithin Ave , Dept. 370-F, Brooklyn, N. Y.



# GROW MINIATURE TREES

Grune authentic, LME dworf trans! Fascinating habby Fabulous profit!

## SEND FOR FORE SEED & MIFORMATION (

MINIATURE NURSERY CLUB Dept 4 K Box 41 7 Village Station . ps Augeles 74 California

STOP RADIO

# NEW ELECTRONIC DESIGN

Nels Tronte line filter eliminates to av Sterference couned by motor pittances exten or burners pie Minory plus salto at TV rard into There and there min wat socket fusty Rels ( was recently in Send #1 ppd No C () \$1.00 ppd.

TUBE WHOLEBALERS CO.



STRENGTHEN your voice this tested scientific way here you may now be able to improve the POWER of your speaking and singing voice the privacy of your own room! Self-training lea-

FREE BOOK Wene Tit AY for Lugene Fourthinger a successful to re 18 a a columbia FithE You must state your site flook at mis ed people d in plan wrapper to a company of the plan wrapper to a company of the Prefect voice Intiffered, 210 S. Climton Sc., Modio FX 1, Chicago S. 10.



# OIL FROM THE PUBLIC LANDS

Get the amazing story of how U.S. citizens can file for all rights on public land in the West, Profits made as high as \$250,000 for \$250; \$11,000 monthly for \$200. We select lands in possible pil areas, show you how to file. Send for free booklet.

## CALIFORNIA LEASE CO.

7075-P5 Hollywood Blvd., Los Angeles 28, Calif.

LOW OVERHEAD-LARGE VOLUME SALES & SMALL PROFITS BRING YOU THESE "LOWEST PRICES"

VITH EVERY TIRE AT NO EXTRA COST

# Why Pay More

TIME SAYE MONEY SEND THIS AD GOOD USED THES NOT RECAPS TEARS AT THIS ADDRESS A TRIAL OF ONE TIRE WILL CONVINCE YOU.

MAY TAKE 10% Off THE TIRE 20 MONTHE WRITTEN GUARANTEE



760-13 4 93	350-17	4 45	P35 20	14	45  LDC 2D	13.65
EXTRA	SPECIAL	30 MOR	ITH WRITE	A COL	GUARANTEE	
600-16 \$5 35	475-18	54 65	100-15 "	34	95 700 20 1	11 1 00
BCO LE 61 B 45	640-18	B 05	750-16 #	10	75 730 30 10.	15 45
450-16 3 33	670-LS	8 55	700-17		95 750 20 Ki	15 03
850-16 4: 7 35	710-18	8.75	750-17	11	75 329 20	18 38
700-16 6.45	74D-18	6 05	750-15	13	95 900-20	17 25
750-16 0 15	800-JB	6 33	835 LS	12	95 4000 20	17 75
525 LE 5 00	820 LS	6 45	4DD 20		79 1100 20	19 55
830-L7 4 83	670-LE	4 35	650-20	10	25 1000-22	19 45
450 16 8 33	760-LE	7 13	3246 4	1.6	15 1100 23	20 48
700 IE 6 45	700-14-1	() T.45	3310 0	11	13 1200 20	25 93
White Walls \$1	OO ENTRA		Missia	201	treads 750 20	16 15

STANDARD 834 N. Broad St., Philadelphia 30, Pa.





Dollars and 30 days of yes yourself this Beautiful Hume. right from the late of the lat 1 Hath San Ha 224 Wheel out steel garm 1 m. the merry numbers of a fet Carrow Economy Harne 645 Dept D Columbus 16 Onto

# You can earn a

In your spare time In your own home' No classes-Ad Materials furnished Cert fied teachers Dipioma nwarded

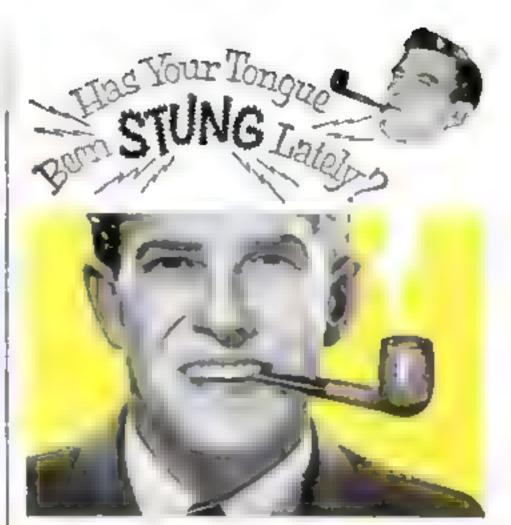
Write today for complete information

SOUTHERN STATES ACADEMY BOX 144-X, Ste. E ATLANTA, GA.

# DRAINMASTER



Without effect city or moving parts this surf on drainer dumps 300 gal uns of water per minute from flooded cellurs, posts, fronties, utc. Just attach with a garden bias to any seren type fauced attach another section of hose to the discharge and turn on the water and it goes to work. Solid brase, non-rusting. Send 10c for Catalog. NOVELTY MART, 59 E. 8th 5t., New York, N. Y., Bept. 155



# NO TONGUE-STING IN YELLO-BOLE PIPES

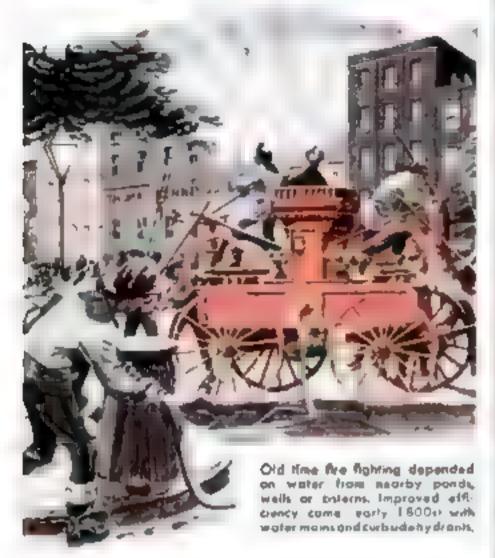
Let the Honey Girl show you why



Don't smoke a pipe that tortures your tongue! Light up a Yello-Bole ... and feel the difference. Thanks to that pure honey lining . . . you can smoke your Yello-Bole to your tongue's content. No "Break-In Blues!" No stung tongue or irritated throat. Switch to a cool, sweet-smoking Yello-Bole ... today!

# 00 <sub>10</sub> \$2.50

# Get Curb Service



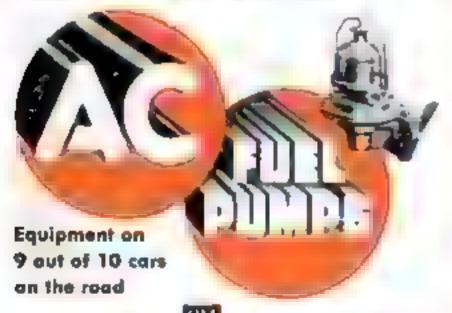
# AC FUEL PUMPS

# . . . America's First and Finest

Fire pumps put fires out, but AC Fuel Pumps keep the "fires burning" in automotive engines . . . with a steady, dependable metered flow of just the right amount of fuel.

That's why AC Fuel Pumps introduced in 1927, soon made old-time fuel systems obsolete . . . why 9 out of 10 cars on the road rely on AC Fuel Pumps for smooth, reliable performance. After thousands of miles of faithful service, fuel pumps can wear out—causing unnecessary roadside delay and expense. If your car has seen many miles of service—renew its reliability—install a new AC Fuel Pump—now

cerving more than 40 million motorists.



AC SPARK PLUE DIVISION



# REVERSIBLE AUTO SEAT COVERS

Made of FLEXION plastic.

theles of: MAKE-ZEBRA BESIGN
or LEGPARD-COWNING DESIGN

Order from Mr. and Save
taberful NNANF AND ZEBRA DESIGN And
LEDPARD COWHIDE DESIGN Fas He Leed On
bether order Water And Statemproof Tallored
With Side Grip Pane's For Tight Fit. Bewin
With NILON Thread For Long Wear. Simple
To In-tall Dress Up Your Lay With A Set Of
Eliber Of These Colorful Expensive Looking
Covers:

10 Day Money Bock Guarantee
Choice Or SPLIT Or HOLLD Front Seat Only
42 Bit Control of Set Por Bich Front & BEAR
ONLY 15 B When Ordering Specify Choice Of
Design Wannet Make of Car And Seat Style.
For the Payment And Save Postage Or Bent
C O D

MARDO SALES CORP., Dept. DS-194 480 Lekington Ave. New York 17 M, Y.



# PORTABLE GARAGE



a flors wherever your car goes a Poide compactly a Room rain, more dust, but air our or steel away a Pinteria your car's finish a Durably compressed of clear transpacent vinyl plantic that is long wearing and tough a Nylon threads for outra security a Spring-tile electricised bettom, holds security in all kinds of weather a Pite all makes and models a Direct from manufacturer a Enclose thock or money order for \$6.75 or sent C O.D.

10 GAY MOMEY GACK GUARANTEE

MARDO SALES CORP., Dept. G-202 NEW YORK ST. N. Y.

# TELEVISION RADIO— Prepare in spare hours for good pay in Television, Radio

and Electronics. Train at home with Frank L. Burny-berry, America's outstanding Radio instructor. Big Kits of equipment formshed Holds testern sets, etc. VETS KANS Approprial for Training under G1 field. Rush name and address for details and 2 RIG RADIO HOOKS. MAL FREE! No salesman with call. Write today?

Sprayborry Academy of Radio, Dept. 65-X 824 M. Connt Chicago 6. Hillenia



# Ship Model Tricks of Experts

# NOW MADE EASY FOR AMATEURS

Now you can easily make a beautiful to-scale model of a gorgeous four masted galleon trim racing yacht of fast ocean liner from the simple plane fully explained with working disgrams in this new manual. Join the fast growing group of those who are turning to ship models for their favorite hobby. It's a fast nating way of spending leisure time and a finished model will get many approving looks and words of praise from your friends.

MANUAL OF SHIP MODEL MAKING tells you how to make any model. Step by step instructions that will help you select and make your tools, shape your hulls, build your deck fittings, and apply your rigging and sails. All about small parts deck houses stanchions, steering wheels, pumps ladders, spars yard and mast fittings, deadeyes, blocks, fretwork finishing, decorating, etc. Trick methods short cuts, kinks and time-saving methods of experts. Almost 100 illustrations, Full citth bound. Sent for 12 00 C. O. D. plus a few cents postage. Write for MANUAL OF SHIP MODEL MAKING

POPULAR SCIENCE MONTHLY, Dept. 653
353 Fourth Ave., New York 10, N. Y.



ACCORMON MANUFACTURERS & WHOLESALERS OUTLET 2003 West Chicago Ava. | Bept. P-63, Chicago 22, III.



## POWER MOWERS AND KITS

a negative memor parts ket for either gas using of electric power. Free plans and want to full we networklohe Write toolships description. Write toolships description. Your name east in metal plat form off all together movers the extra constitution of the 12" of a ten belt or direct rise. Many exclusive features ALL. AT LOW part Tolly Philips.

TEMCO MOWERS Springfield, Mo

# MEN WANTED Job Offers Coming in Factor than they can be filled

Mon who are such tous and mechanically inclined can get into these her professions. Took a new first tous of the personner. Osafrina, wasten machiner to previous experience necessary You may enture, in our short term courses or study processary for a segree of harbe or of Took inspirement. Write for the Bulletin on District training Voterans get free copy on "Facts on Veteran Education".

ALLIED SCHOOL OF MECHANICAL TRADES





Important. Man's most useful tool. Easy in calculate instantly. Multiplying, proportions, division roots, etc. 'Nigh Vision' Clear View slide Full 10" Rule. A. B. C. D. C. and R. scares. FREE answers hustraction book on how to get correct moswers hustantly without pencil or paper.

Gene Loewy, 545 5th Ave., Dept. 448, N.Y. 17

Limit there rules to each couper.

TRAPPED

The dangarous and willy Bengal Tigar—popular attraction in zoos and circuses—is often caught in traps like this. These traps protect the hunter without harming the tiger.



# AC Aluvac Is The Best Trap for Dangerous Engine Oil Dirt

Another trap—just as ingenious—just as efficient—is your AC Alueuc Oil Filter Element trapper of dangerous dirt, sludge and other impurities in your car's engine oil.

- AC ALUVAC keeps oil clean . . . removes particles as small as 1/100,000 of an inch.
- AC ALUVAC has greater filtering area...
   ten times greater than ordinary elements.
- AC ALUVAC has no harmful chemicals . . . won't remove detergents in heavy-duty oils.
- AC ALUVAC is durable . . . resists the action of harmful acids, gasoline or water.

Money Can't Buy Better Engine Protection.



Protecting More New Car Engines Than Any Other Brand

C SPARK PLUG DITISION



CENERAL MOTORS CORPORATION

Amozing Invention—"Magic Art Reproducer"

# YOUR



Den't be limited to stockard danigus averyone week! Now use original, different designs on a hobbies and hand craft tems from newspapers magazines

books, wellpaper patterns, dra-perios flowers, fruit, landscapes, pictures of your child co-ebrities -apything or anybody

Magie Art Reproducer automatically reflects anything you wish to reproduce on any paper graph paper, fabric leather, plastic metal. wood dahes etc Just follow the lines with pencil pen brush or etching tool for profusional design Enlarges reduces Black and-white or setual co.ors Indoors and out Have fun, he popular earn extre money from your improved hobbies

FREE TRIAL! Send No Mency. Pay postman only \$1.96 plus postage. Or remit now and we pay postage. It not delighted in 10 days, return merchanding for prompt refund

NO LESSONS! NO TALENT!

Englass ideas for all hand-craft habbleseven if you cen't show e stroight line)

etc for book ends, some base, a hum decoration. 3 001 other possible.

Personalita. Propagation furnities as in information of years to be an pet Repredicts for each parameter for each parameter, simplests, servicely shelf upda etc.



Also for All Types of Prawing!

Human Daures -- Outslook ture— the objects? Copy plump rationto (mrifante, usurprible maps, etc.

- 自由的基本的 "Simply Secrets of Art Tricks of the Trade."

NORTON PRODUCTS, Dept. 44068, 296 Breadway, N.Y.C. 7

Deluzo

Medel

BENJAMIN SUPER CO. MORE MODELS

LOWER PRICES SAFE . NON-TOXIC . HI-POWER



East to suggested base you cost Seets Contridged Cut 51350 at the 177 Brojum of it. To beta 4 topic of it! 51350 Write Today for Hibstested Forder of All Models 51350 Bottomic Air Rifles and Manjamin Air Pistots. Benjamin Air Atria Co., 257 Mariou 21., St. Louis 4, Ma., U.S.A.

GAS PISTOL

DEGREE

Big Demand for Graduates

APRONAUTICAL, CHEMICAL, CIVIL, BLECTRICAL, MECHAN-ICAL and RADIO ENGINEERING (inc. IV and Electronics).

High reds of young men are earning 0.5. Empinggring DE GREEN unnually to this recign and necitation cor around operation. New vertex a art outerly Many of Men's earn a million that of their college expenses to this targe industrial center.

Live to lion. Competent instruction. Thorough intense prac-tical program. Aladers, we requipped informations including new physics inhomatory and mounts wind tunned individualized instruction emphasized.

One t amproved for O I . Engineering menorators courses Students from 4d states and 21 foreign countries Enter June Soptember, December, March. Samt coupon for free estates and furl information. Enroll flow

- SEND COUPON TODAY

TECHNICAL INDIANA

843 T. Washington Soulevard fort Wayne 2, Indiana

Places send me free information on B. S. Engineering degree in 27 months of thecked.

☐ Aeronautical, ☐ Chemical, ☐ Civit, ☐ Blectrical, ☐ Mechanical, ☐ Radia-Talavisian.

Name .....

Address.....

tirtalog stuting makes,

JEEP TOPS and CURTAINS

All Brand New . . . Not Surplus Made or neavy Canyas Duck Water; Waterproof MILITARY TYPE models. Top and

\$59.50 Curtains, complete less bows TOP and CURTAINS HALF CAB MODELS CJ2A and

less bows

TOP and CURTAINS, models CJ2A and CJ3A, complete for entire Jeep, with hard-

When ordering pience state exact model til sites FOB & C 225 den en CObs.

1901 TROOST-GR1800-KANSAS CITY MO



Finest Procision Optics feather abt. Money Back Guarantes Easy Pay Plan Leather Cose Includ. Free! Catalog & Book How to Select Sinoculars" Depler Inquiries Invited

Bushnell Bldg., Dept F66 Pasadena 1, Calif.

33 MODELS BUSHNELL Binoculars

MAKE rlows CHLTTVATE MONEY HACEOWE HAMES Selling

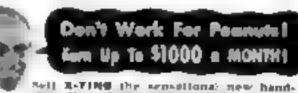
ESHELMAN Pewer Newers Riding Tractors

SPRATE DOZIE 1 13 5 H P CU15 ADD NAME SES ROUS motors ow as 101.13

And GARDENS WOMEN CAN OPERATE IT ESHERMAN, Dupl- 4 Belto 2 mg 3-13 M Mich gan Ave., Chicago E II 7020 Hot ywood Bivd.

FOR LAWNS

& Rolary F Herr LUG AREVI & 28



wartime series for oght of chemics. Set a for only \$4.00 fertime guarantee have home needs to more Send for little anisa hit and literal profits plan for cerular star V Ting to the as demonstrator and only \$2.31 Money to to it is send the case of the send of 928 York Street, Cincinnati 14, Ohlo.



Sprays Area Up To SG Feel All Around

Can Be Twisted. Wound Around Bushes and Fower Bods Spaker Sares Water and from stable | Shiweight made from Rusable Sealute plantic W I' not por or m ! even if stored wet Complete with brass connector

20 ft fength \$2.30 50 ft length \$4,75

7-Day From Trial Send payment now for aprin her you want We poy Want We boy accepted eyou pay posteger Money bark within 7 days if not shooturely delighted. Order NOW!

. BAYES WATER Pats where the want it when you want to speak on appropriately a me the valve changes the sprink re-B Beatlife? WEATILY STORED to company) If can be brid in the pairs of the

ha p4 FIVE-TEAR QUARANTEE WAS and rot or milder materia, and workmanship summaters.

HOMECRAFIS, 799 Broodway, Dept. \$516, New York 3, N.Y.



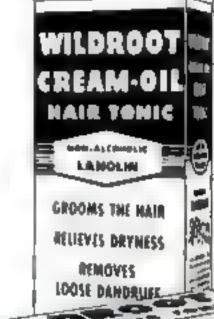
# CAN YOUR SCALP PASS THE FINGERNAIL TEST?

Don't give dandruff and dryness a chance to ruin the looks of your hair Keep it neat and natural all day with Wildroot Gream-Oil. Made with the heart of Lanolin, so much like the natural oil. of your slon! 29¢ 60¢ \$1

while learning

Get that successful look with America's largest setting Hair Tonic!





WILDROOT

"YOUR HAIR'S BEST FRIEND"



VETERANS—CIVILIANS
REPARE FOR NEW JOBS

L. C. Lang, N.S., M. President, RITA & Please Schaels

Many New TV Stations to be Built Soon in Every State
form White Tou Learn. My modern training prepares you at home
to your spare time—often within months. You learn the practical
easy way by using actual parts and equipment. Many of my students
make \$25.00 a week repairing Radio TV sets in their space time

GET MORE! LEARN MORE! EARN MORE!

1. MORE COMPANIAL You build and keep this BIG SCREEN TV RECEIVER plus Super Het Radio Receiver, RE Signal Generator, Combination Voltmeter Ammeter Ohumeter C-W Telephone Receiver, AC-DC Power Supply Complete with all tubes, including big TV picture tube

2. NEW YORK ROUND TEIP! Only RTTA gives you a ROUND TRIP TO NEW YORK CITY at NO EXTRA COST! Yes, from anywhere in the continental U.S. or Canada. I II pay your way to New York and return after you housh your complete Radio IV course. Get 2 FREE weeks, 50 hours of advanced study at our affiliated PIERCE SCHOOL of Radio.

3. FCC LICENSE COACHING COURSE! Prepares you at home for better pay jobs that require an FCC License. Given so all my students at NO EXTRA COST after TV Theory and Practice.

4. ADVANCED FM-TV TRAINING! For men with previous Armed Forces or civilian radio experience. Advanced Course comes complete with kits, including BIG SCREEN TV RECEIVER and FREE FCC License Coaching Course

RADIO-TELEVISION TRAINING ASSOCIATION
1927 Brondwey, Studio City Studios, Ment Turk City 17, St. Y.
LICENSED BY THE STATE OF NEW YORK

# VETERANS

start their own profitable service business.

MY SCHOOLS FULLY APPROVED TO TRAIN VETERANS UNDER NEW Q I. BILL! If discharged after June 27, 1950—CHECK COUPON BELOW! Also approved for RESIDENT TRAINING in New York City qualifies you for full subsistence allowance up to \$160 per month.

Mr Legnard C Lang, President
RADIO-TELEVISION TRAINING ASSOCIATION

1629 Broadway, New York 18 Dept P-6
Dear Mr Lane Ma me your New Free Back & Sample
Lesson. Show see how 4 can make Big Money to
Television. I understand am under no obligation

Name_				Age
Address				
City			Zone	_State
	HERE		VETERAN	NON-VETERAN

# \*75 A DAY CLEAR PROFIT in your back yard or basement!

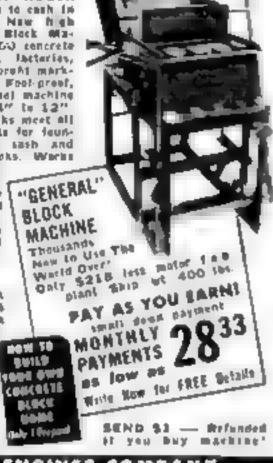
MAKE CONCRETE BLOCKS With Amozing New LOW PRICED GENERAL BLOCK MACHINE

Profits Within Your Reach Yes sen't need much such to cash in so the building boom! New high speed, low cost General Black stately produces up to 1 000 concrete blocks a day for homes. Inctaries, Buildings, garages Your profit markup in 100% correte, study sted machine one make any size from 4" to 12". These superior 3-core blocks meet all building code requirements for four-dation, absency, carner such and many other types of blocks. Works Indiana are out, from payers anywhere! Blooks with the carner and water anywhere! Blooks

Indiants of out, find payers and payers and payers the payers and blacks and blacks and blacks and blacks and the payers and the payers and the payers are payers are payers are payers and the payers are payers are payers and the payers are pay

### EXTRAI

hearing liturinated beek bives floor plans for a sensational senerate block bungators. Tells how to lay block, how concrete build stops, much and understa floors at at great savings. Written by expects Can save many times the cost of the machine! Cat it now:



GENERAL ENGINES COMPANY

Dapt. S-6J, 307 HUNTER STREET, GLOUCESTER, N. J.

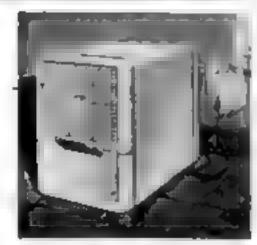
# Basement dampness

# -with the amazing FRIGIDAIRE ELECTRIC DEHUMIDIFIER

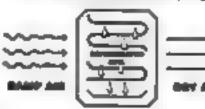
Only 181/4" high - 201/2" long - 11 1/4" wide

Positively controls moisture in linen closets, basements, storerooms, bank vaults, workshops, or any closed area up to 8,000 cu. ft. where moisture is a problem.

Fan circulates air over refrigerated coil. Moisture is condensed and collected in container. May be connected to drain. Dry, filtered air flows into room,



NOW DEMUNISHING WORKS



See your Frigidaire Dealer for further details. Or write for free folder to Frigidaire Division of General Motors, Dept. 2089, Dayton 1, Ohio. In Canada, Toronto 13, Ontario.

**Built and backed by General Motors** 

# EXTRA COMFORT!

# Genuine WOLVERINE PIGSKIN

WORK GLOVES

Genuine Pigskin, tanned by the Secret Wolverine triple-taining process. Amoring comfort iteal extra wear!

## A New Poir FREEH They Dry Out Hard or Stiff!

Just try on a pair. No other work gloves in the world like them. Just drop us a postcard for name of your nearest dealer and a useful got FREE to you besides.

Webstern - Box IU 6 - Recitors, Mich.



# GET INTO ELECTRONICS

You can enter this uncrowded, interesting field. Defense expansion, new developments demand trained specialists. Study all phases radio & electronics theory and practice TV FM hemadeasting, servicing, aviation, marine, police radio. 18-month course, Graduates in demand by major companies. H S or equivalent required Begin Jan., March, June, Sept. Campus life. Write for catalog.

PEPT. SOJ VALPARAISO TECHNICAL INSTITUTE VALPARAISO, INDIANA

# QUEEN ELIZABETH Coronation Stamps

Historici New exciting set of 62 stamps. Every stamp from a different Crown Colony OUR SPECIAL PRICE \$2.00 COMPLETE

This special price is made in order to introduce our barrain approvals to you Since this is a very small lease we must limit one set to a customer. Order Today, Money Back if Not Satisfied

MATIONAL STAMP SALES

BEE Righth Ave., Dept. AT, New York 19, K.Y.

# BUILD YOUR OWN FAN



# Free Book on Arthritis And Rheumatism

HOW TO AVOID CRIPPLING DEFORMITIES

Explains why drogs and medicines give only temporary relief and fall to remove the causes tells all about a specialized bon surgical, non-moral at iteratment wh, it has proven successful fer the past 33 years. Write for this 44 page FREE BOOK today,

**Bell Clinic** 

Dopt. 36

Excelsion Springs, Mo.

# Stop LOSING MONEY!

Holes in pockets cost men thousands of dollars yearly in lost change. PURSNPOC, a new genuine leather change purse fits soughy inside pockets to guard them from holes and to protect you against loss. Used by Doctors, Attorneys, Traveling men and many others who carry change in their pockets—by Golfers for carrying tees, etc. Wonderful for the Carpenter, Home-craftsman and Mechanic who carry small onlis, screws and other tiny pieces in their pockets. Your MONEY BACK if you are not delighted. Cost only 75¢ each or order set of two for \$1,25.

BERRY'S PRODUCTS, Bax 3171, IL 12 St., Reading, Patesylvania

# NOW ONLY

Drive Screws, Nuts, Bolts

# 10 TIMES FASTER

with DRIL-O-DRIVER

Picture shows greatest little invention ever designed to save time and work for carpenters, cabinet makers, home craitsmen, hobbyists, electricians, plumbers, farmers, me-chanics—everybody who uses tools. The new DRIL O-DRIVER is an E ectric Dril. Atinch electric drill. It drives slotted and Philhas screwn nuts and holis, Operator controis speed and force of drive Designed to give durable useful long years of streict Smal, enough to fit any kit Unconditionally guaranteed. If your dealer does not stock Dril-O-Driver send \$9.95 today for your DRIL O-DRIVER, Screw Driver By and Drilo "Magic Connector" an adapter en ab ing you to use 54 standard loos avanable to electric dr I owners. We pay postage

THE DRILO CORPORATION

201 E. Carson St.

Pittsburgh 19. Pa.



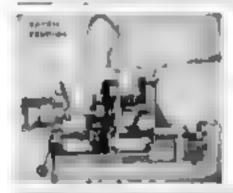
AMAZING, PERMANENT MAGNETS-WILL NOT WEAKEN) NON-ELECTRIC AMAZING, PERMANENT MAGNETS—WELL NOT WERKEN NOW ELECTRIC

C. DEN MET WERKEN AND HOLDER SAME RESERVE OF A FOR A SERVEN FOR A

Traffic men earn \$4,000 to \$10,000 and up. Thousands of firms 6-ed chapets on rates hardle regulations. We train you thouse in aparal limits to the first pain. Personal training under traffic mathematics Planetsed chapters with help brighted for the page book.

Traffic Management, the Kentl area for Personales. Traffic Management the Fast specific Protestation.

LASALLE Extension University, 417 So. Dearborn St. A Currespondence intribution Dept 683-7 Chicago 5. Iti.



# Start a NEW BUSINESS!

er Add to your present Repair Businute

## SHARPEN DULL PIPE WRENCHES

PIPE TAPE & DIES "GUM ' CIRCULAR SAWS

We to for Information

J. C. MOORE INDUSTRIES MOX \$ 276 Fredonia, Pa.

# BE Á HIGH-PAID MAN IN 🖔 YOUR COMMUNITY with this LONG NEEDED INVENTION

Earn up to \$10 000 or more per year! , 1 ~ 1 A worldwide product needed by the vibrate barness and farm

priced to sell quickly at lung profit! Automatic Red Cemet is es into action as see n as fire starts smothers file without human aid. It's a sairs natural.



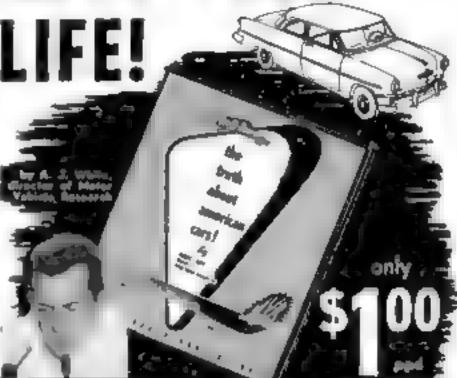
FREE SALES KIT

Demonstrator there is now intersured, fig., then you will be the Hardson's leaster type left. They are provided with make you are represented for the house small at T KOW's Some to be our required a well be hope and about. We to for detacts, today's

COMET, INC.

Dept 357-F, R. C. Bidg., Littleton, Colo.

# THIS BOOK CAN SAVE YOUR



# Here's the book that only MVR could write! It's "The TRUTH about American cars"!

If you wont to know the truth about today's automobiles, this is the book that will give it to you! Motor Vehicle Research's dynamic director, A. J. White, has ripped away the veil of public indifference that threatens to sabotage automotive design. Here are all the facts, in 73 sensational chapters, about the cars that come off Detroit's drawing boards and assembly lines. Every feature, every fault is brought out clearly and coldly for every motorist to see and read. If you own a car, you need this book! Don't gamble your life away . . . get your copy of "The Truth About American Cars" today! Only \$1 ppd.

Project No 1678 -71- "Carbon Mac-cords, Your Car - und YOU

Project No. MV8-845 - "Behind The Scatter in Serentiffe Car fasting

Project No. MVE 218 - "The Big 2 In 153 - and 4 More Makes 4 51 april

The first emblesed test-by-lest post on the dig I as well as the evendate to the NISE 1 mmpatitum public al all 4 popular los prico mith finderet American care that will shock and startly you! This

200	MOTOR VEHI				
1111 E	MATAR VCIII	OI C	DECEMBAL	I was DE	DT .c
IVA -	MENTER OF THE	BH M	WESTANDA	4. AME 115	PJ. 18
JAIN.	*****		*****	I I inter the	
1	PITHUM AES	Q T Q		POSTON	IF, WA
30	Bullion of the R		the selection of		
	CONTRACTOR AND AD IN	+	for which good		

				chi sed.
OFDE	. capies		V4.71(\$1.	60 week)
maney order (70)	اب ساوده	□ MYI	t-167 ( <b>92</b> .)	Mosch]

		— capies of i MYH-210(31:88 each)
□ check	Home	
Dead		
D CAR	City	

# Save hundreds of Dollars with this NEW ALL-METAL ELECTRIC SPRAY GUN—Pay Only \$1 a Week

ENTIRE UNIT UL APPROVED

Hundreds of tough tasks are made sany with this little. All-Metal Spray Gun. The finished work cannot be told from high-costing professional jobs. Just press the trigger and you're doing the Job evenly cleanly and ens lly, No compressor needed Use for spraying paints, including rubber base pa atslacquera, anamola, varnishes. chemicals, oh, insecticides. deodgrants shellacs, for waxruet-proofing. waterproofing, etc Built for heavy duty AC current Entire unit, every part, fully UL Approved, inc uding 8 it 8 J. Neoprene Cord & Pug Set Given at no extra cost 5 extra nozale discs, 232 pg Home Pixit Guide'



Container All Matal-No Pinetic or Glass beed This New Medel Available Only from Us 51 down-10 weekly

Carrying Charges Added

## == "MAIL 10-DAY FREE HOME-TRIAL COUPON" " " " WALDORF SALES CO., Dopt. AG-2506 362 Control Park Ave., Yonkors, M. V.

E Bond Spray Cun, include Free Rock I opened d. Will pay post men 416,43 plus pretent if het delighted can return Spray Gun within 10 days for purchase price refund.

1 shaloss \$17.95 300 p43 postuge, Same refund Guarantee.

of t unctoon \$4 depoints With pay at rate of \$1 weekly after de-lyery one nierest or carrying charges added. | Will pur mouthly

Name		Ì
41		
Address	7: HTT	me te
City		
State	9 16 40	M MI MAN
APO FP Foreign		D's



# GUARA BITE-PRO NEW NYL

TASTELESSI CUSHION BITE



Throw Away Nicotine TRAPPED IN MEDICO'S FILTER

# NEW AUTOMATIC DEFROSTER



# **YOU MAKE UP TO \$4** ON EVERY FAST SALE!

Missions of defroster attachments sold at \$.2 50 with new guaranteed HOL WIN at 67 \$5 sales breaking all records Men sell-

ting as many as 10 and 12 a day right new Your profits big as high as \$4.00 cash ob every sale Converts any old style refrigerator into automatic descripter in 10 seconds Just ping in Terrific demonstrator Women crazy for it at this price Se ! 4 out of 5 calls

NO CHARGE for comple e sets be kit and tor Rush name if you've ever sold anything you'll clean up with HOLWIN All maded Pree Send name today for \$140-a-week opportunity and offer of demonstrator

DEFROSTER SALES CO., 415 Lafallest, Dept H-96



SEND NAME

Hash name for free mark his and affer of drawn. Same sk) rocket-Fu -m ing Fend name to un bug money.



# Wheels

6" Disc Wheel by Tire B/18" or 34" sleeve.
6" Disc Wheel by Tire 5/16" or 34" sleeve
7 Disc Wheel 14" Tire 15" sleeve
8" Disc Wheel 1 Tire 15" ball bearing
8" Disc Wheel 1 Tire 15" ball bearing
8" Disc Wheel 2" semi-press. T. 15" B D.
10 Disc Wheel 2" semi-press. T. 15" B D.
12" Disc Wheel 1 78 semi-press. T. 15" B D.
12" Disc Wheel 1 78 semi-press. T. 15" B D.
14" Disc Wheel 1 78 semi-press. T. 15" B D.
15" Disc Wheel 1 78 semi-press. T. 15" B D.
15" Disc Wheel 1 78 semi-press. T. 15" B D.
15" Disc Wheel 1 78 semi-press. T. 15" B D.
15" Disc Wheel 1 78 semi-press. T. 15" B D.
15" Disc Wheel 1 78 semi-press. T. 15" B D.
15" Disc Wheel 1 78 semi-press. This Judge 1 D T.
15" Disc Wheel 1 78 semi-press. This Judge 1 D T.
15" Disc Wheel 1 78 semi-press. This Judge 1 D T.
15" Disc Wheel 1 78 semi-press. This Judge 1 D T.
15" Disc Wheel 1 78 semi-press. This Judge 1 D T.
15" Disc Wheel 1 78 semi-press. This Judge 1 D T.
15" Disc Wheel 1 78 semi-press. This Judge 1 D T.
15" Disc Wheel 1 78 semi-press. This Judge 1 D T.
15" Disc Wheel 1 78 semi-press. This Judge 1 D T.
15" Disc Wheel 1 78 semi-press. This Judge 1 D T. 35c un. 45c sa. 70c sa. 80c pa, \$1.00 pa, \$1.50 aa, \$1.80 pa, \$1.85 es. UNITED WHEEL STAMPING CO.

## **60 POWER TELESCOPE** 53.95

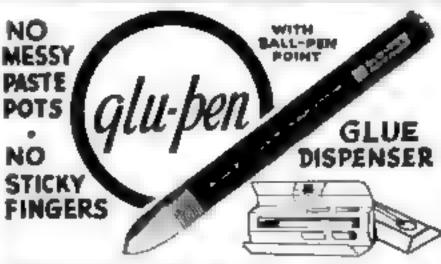
VARIABLE EYEPIECE 20 x 40 x 40—8RASS BOUND NEW Three (elescopes in one 3 different the beight mages as histometric pursue to ease find rende Gueranteed for extra link range, in here di rant of de in here it that of deta pen-ple oportacionis, ships, fee answhere near the spines as the transfer of the spines as the spines of the spines as the spines of the spines of

CRITERION CO. Dept. P58-10

331 Church St. Hartford 3, Conn.



Perfectly scaled -Procision detailed niniphers medals that picalo Those used by U.S. shiitary tradelg. Fall line of Sares, ships ofenes of all makes H SIC PINAY HETS CO. MC. MICHAEOND HILL THE ET TO Y



Glu-Ten adheres instantly and securely 5 000 "dot adherive in every carryidge used in non Parkaged in 6 5 0000 "'dots" b. a containing sen in Forest green chamel with 2 cartridges of glue this 62 95 postpaid.

**HERALD SALES** 

P. Q. Box 1753

Fort Worth 1, Taxes





MFG. CO., Riverton Bex 6064-83. Seattle 68.

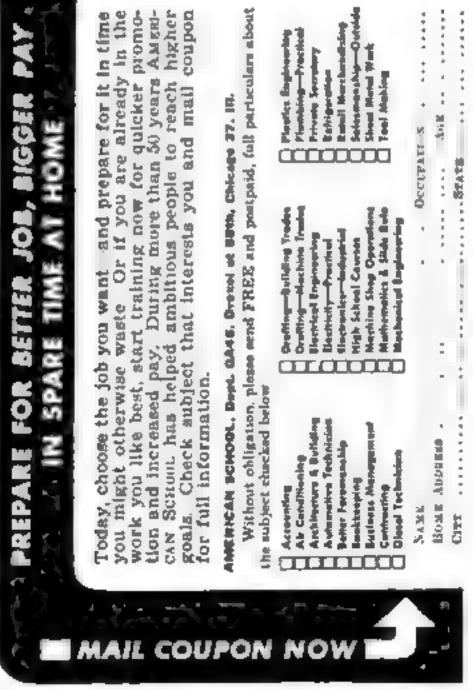




Minneapolis, Minn,

21 So, Third St. Dept. PS-&

# Prepare for the Bar! Write today for a copy of our FRbE book. The Law Trained Man," which gives the bar rules in your state and preparing at home in your water and preparing at home in space time for the practice of law by studying the famous file-theore but training course. All needed instruction material is furnished including big its volume law library. Law it ploins awarded. Studerate tuition easy monthly terms. Write for FREE book today i BLACKSTONE SCHOOL OF LAW 725 N. Michigan Ave., Cept. 120-A, Chicago 1, Illinois are already in the promore particulars about AK years prepare for it for quicker Chicago 37. IR. 110 end 01 8 you



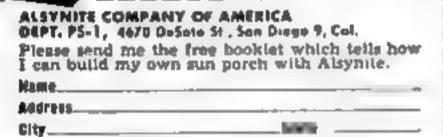
# Free Booklet Tells How To Build a Sun Porch with original

TRANSLUCENT FIBER GLASS PANELS



Alsynite is the new wonder material for sun porches, skylights, window wails, awnings, etc. It is shatterproof and feather-light as easy to use as

plywood or corrugated metal. Can be sawed and nailed. Economical, Seven colors, corrugated or flat. Thousands of uses Easy to "do it yourself"



# MAKE EXTRA MONEY AT HOME LEARN HOW

Plants in California and Obro. Distributors on Processi Ciber.

with "know how" in Plastics. Interelate's new Plastics course fells and shows how to make handwiseds of fact willing stress out of Plastics. Gives complete training in fabrication, carting, lamination, molting internal curving etc. in simple easy, step-by-step language and pictures. Plantics and Fabricating XIIs for \$3 univable Plants: stress come with training at my SHOWS rains cost. START A PLASTICS BUSINESS OF YOUR OWN. He arter industry holds much pressure for the future. You can make big money manufacturing ourelties. Inys, signs, etc. in your own home as space as fall. hone. Don't west! Leven NOW how Interstate's Planton. Fracting qualifier you for success in the Planties field.

> PLASTICS AND SUPPLIES PURHISHED POR 22 VALUABLE PROJECTS

ITERSTATE TRAIMING SERVICE

Dept. C2F

Portford 13, Ovegoe

Precision built belt drive Par for Homes Stores Factories liams etc fan France weided atoel Riads Dia. 24° B. P. M. 550, CPM 5400

Leng Reconsidence 34, GE My 58.95 New Onice Mater 515.95 Mår. Aluminum Side Wall Shutter 512.95



Kitchen Ventilatura Exhaust Fans, As le Fans B uwers, Heat Boosters, Deak Fans, Window Fans Bluette, Heat Boostern Deak Page Window Page Bladen Quarde, Showers Stutors etc Free illustrated catalogue deplete seguries support



TO MAKE

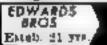
hard-hallicon

HOYELTIES

PURMITURE

TENGRY

PLASTIC



BAND Grant Myone, Swat 115

BOX 5-STA, E

# PRECISION CALIPER

With set serve promptely fixing position of the stade

This trade mark pussuations highest quality

R Z-B PROCUSTON CALIFFRS made by the sending Eurepeat precision had staff there is underly highest are care if for any had of hierarchine work ("heorie ster-spring transported esame hard on all pregapities surfaces print derivations for the thread and depth. To read and any 1 125' S' overa; S' graduation.

The following modern have the fusions M Z B this look which speaks fixed and never abiliting setting when

# 20 Sh Chrome Size! Dil' A 1 126' \$14.00 # 20 Sh Chrome Size! Dil' A 1 126' \$14.00 # 30-64 chr me Size! Dil' A 1 126' \$16.50 # 30-65 Sia ni sa Size! Dil' A 1 26' \$16.50 # 20 Mer. Pres Size supplied Free of charge with each oil per leading race supplied Free oil per leading r You puy not any on ( C I) Money back guaranter Other mesters up to 12' available. Send for our ratalog of fine

INTER-CONTINENTAL TRADING CORP. HIW •



Living room 12x14. Master bedroom 10x12, Nursery-den 10x11, Kitchen 7x10, Bath SaB. Concrete block built, El Blue prints, material lists, exact instructions for 3 designs.

Complete ppd.

SUNNY-CAL HOMES, Box 309-E6, Mollywood 28, Calif

# Catalog • 3000 Novelties 10c

ed the for aman of catalog of sevelties, live anima a scientific sumplies habbies, funmakers slanes & boats, to lers, rad se, auta & he accessories to recopes, magnif or companies, being a further than accessories to recopes, magnif or companies, rad se, auta & he accessories to recopes, magnif or companies, being a services to recopes, magnif or companies, being a services to recopes, magnif or companies, being a services to recopes, magnif or companies, being ambers gadgets, grinter supplies, printing sets, and nee, motors, abortes, knives b I fo ds. Freeworks, gunt, riffes, escript, books, games, plants, etc. Send farms, address & 10c tag

JOHNSON SMITH & CO., Dept. 887 Detroit 7, Michigan



MI.N (16 to 50) Go to Sen Travel foreign countries

Civilian occupation Excellent pay. Ship and yachting Jobs adventurous-exciting

FREE Information DAVENPORT SEAMEN'S SERVICE, Dept. 84 BOX 1354, G. P. O. NEW YORK 1, N. Y.

# B 0 1 1 1

# Genuine Dupont Plastic

From Your Old Loose Plate NO IMPRESSION NECDED tes dustributes their traction думини видивор, запрадовин калад emeted) Sanare. ciale is a a new natura, pink Dispont Plastic Plate w. h same

er h or new mature man her SEND NO JUNEY Nate at our few prior if gheat bilers pa d for Drotal Medican, Copt 300. Chicago 2.

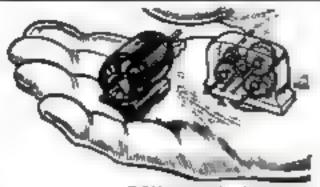
AG-DA TRIAL

# ADULTS



THEY'RE SENSATIONAL! Broad new saries of acclusive phonograph records Splity samps that will make your party a hawling success. Songs and music in a style you will like. Complete set of SIX DIFFERENT sengs on good quelity 10-inch 78 E P M. records, sent proposed for \$4.95 in souled peckegs. No C O D.'s.

NATIONAL, Dept. 478, TOLEDO P, ONIO



DOMESTIC: MOTOR & GEAR KIT HOUSING BATTERIES CLIPS

unly **57**.98

POWERFUL MOTOR:

One of the similarly previous motory ever built yet does GIANT SIZED JOBS Dyives Model Platers flow a time ration Sets. Working Models. Trains and Curs sets with amazing spreed up to 600 K P. M. for at this as 60 is P. M. manus the resting appeal up to 600 K P. M. for at this as 60 is P. M. manus the resting appeal of jets. We as bloney thing act. The MICHTY Mark PT does handwards of jets. We a bloney Looks exactly like hig mater yet measures Palay, and weight one came For on y \$2.28 YOU GPT LOTS Make with the Might) Midget you are a cample e set of years and policy and a transparent mark to get a cample e set of years and policy and a transparent mark to ma. NO SHOCKS SPARKS or SHORTS NO TRANSLORMER, KFEDED Reverses immediately that Endead has been check or makey only for 2 M for this entire set and we will say pastage, C.O.D. arriers plus postage.

IMPERIAL SALES CO.

480 Lexington Ave., Gept. M-472

New York 17, N. Y.





PROFESSIONAL MECHANICS HAND TOOLS

Farm Household and Special Tools

TOP QUALITY, FACTORY GUARANTEED

Write Today for FREE CATALOG MECHANICS CO-OP

Oakland & Colif Depl W

SHARPENER Service departments of leading Lawn facturers use Modern Lawn the Mower Sharpener One lever moves lawn mower into grinding posttion. Gaseline and oll remain in engine while sharpening no disman-titing of wheels, roller or handle The Modern is a precision bed knile

grinder—no extra grinder to buy. Imitated but never equaled-Compare before you buy If it isn't a Medern it can't be Modern

(Prices subject to change without notice)

MODERN MFG. CO. 180 N. Fair Oats - Pasadena 3, Calif.







If he cannot supply you, send \$15.95 we pay pastage; or sand \$2, you pay balance plus pestage and COD. 10-day meney-back guarantee.

## CAPET ELECTRIC - MAIR CLIPPER

The same fine quality clipper used and seld in many beauty skops. See your shop, or dealer, If you prafer, send \$10.95-we pay postoge; or \$2, you pay postmon balance, peylege and C.O.D.

ELECTRO TOOL CORP., Dapt. WS33-F, Racino, Wis

LEARN TO SHOOT. become an expert pistol shot!



Crosman

"well-known air pistols have long been among the best obtainable."

Gen. J. S. Hatcher

Am, Rifleman Magazine, Jan. 1933.

CROSMAN ARMS CO., Rechester 20, N.Y. Dept. 46



the upper corner of the negative and all your prints AUTOMATICALLY, AS YOU TAKE YOUR PICTURES, so you'll ALWAYS know when they were taken. For black and white or color. SEASON SET, Consisting of the next 4 SEASONS and YEAR MONTHLY SET, Consisting of the next 12 MONTHS and YEAR... PER SET AT YOUR PHOTO DEALER or order Directly from HANG FALTIN & CO., 425 Normay St., YORK, PA. (If ordering by mail state flux start) Satisfaction Guaranteed or Your Money Refunded

# Ball-Bearing SPEED WHEELS



7 78c (Semi-presentic fire, bell bearing) \$x1.25 . \$1.05 10x1.25 . \$2.20 1.05 10x1.75 2.30 \$×1.75 6.2 2.20 10×2.00 12×1 78. . 3,48

INDUSTRIAL WHEELS Ling Have, Semi-Printmatic tire

\$3.45 10×2.00 \$4.10 6×2 5W 4 00 8.20 10×2.75 6x2.00 S. L.5 # : Z. OO 12:2.00 4.90 B.40 9,20 8×2.50 12×3.00 L414-00 15.15

Smooth Base Promounts: tire and tube \$11.00 12x4.00 \$12.10 4-3.00 8.80 4.00mB 4.00x8 , 13.10 10:2.75 13.40 10x3.60

Available Now - CASTERS Water for citing are on all wheels Prices F O D. nur plant

No c a d. orders. RROWN

IIM SUNSYA SMON SOFT

SAVE

MONEY

INSTALL

YOURSELF

TOY COMPANY PS-683 AKRON 10, OHIO

USE YOUR ATTIC for STORAGE, SGame Room, Guest Room

Basy to Install. His special tools needed. Sturdy and wall-built. Gives quick, ante, nery access by ettic. Disappears when out in test, law cast. Approved by FHA. Write for complete FREE Informafloa feday,

HOLLAMOOD 5437-4 YALE BLVD. . BALLAS, TEXAS

# S FREE COURSE! BIG PROFITS! S -Flocks & Sandblasts

Deal Propose Spray Goal West anty 25 lbs. Air Pressural

O Innumental of uses in Home. Stap Industrial Makes Auto Interpret I can a New Stape I were a Marie for ampulsation Religiological Add it constituted for the Etch a Front with the action of the Stape I can be a formal formal and flush from the formal and flushing the flushin

SLASTO SPRAY GUN MFG. Dept PS-0. 7007 Heat Ave., Les Angeles 47, Calli.

# Build your own JET ENGINE!



Order these plans today

J. HOUSTON MAUPIN, Dept. 66, Tipp City, Ohio







# with Science's New Midgel Miracle the Presto Fire Extensioner says W F Wydoller Onto. Mark hers hear he up-Pride file fact a second by are and the part of the Same hat Marting Industries, the Dept (10 201 East 16th Street No. 10 York J. N. Y. 10 Second A. 202 East 16th Street No. 10 Second Ea New York 3, N Y If a m want a real or Pre to to mee as a demote raint send 5, in Minner back if you with a



# YOUR

# Dara-Ven AUTO-BLINDS

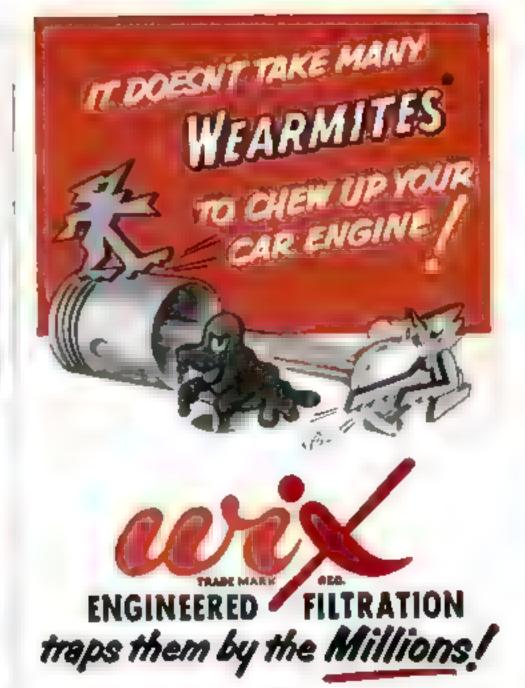
Smart . Distinctive Does Not Interfere with Drivers' Vision! Dims Asonylny Headlight Glaret Everybody wants this des-

tinctive outs blind that keeps has we all backs of tear seat passengers and protects your uphalstery or seal covers from feding! Mode of plastic and aluminum - you install it yourself in minutes order No COO. 10 day



order yours, give year, make and model of tor and enclose theck or money \$5.95 with only a screwdriver! To maney back guarantee,

PARAMOUNT VENETIAN BLIND CO. Dept 151 East 126th Street, New York 35,



Close-fitting parts in your car engine can be scored and damaged by the Grit, Dirt and Tarry Sludge your motor oil picks up. A WIX HEVI-DUTY Cartridge in your oil filter takes these engine destroying "Wearmites" right out of oil circulation. You can stop them from chewing vital engine partsand your pocketbook.

WIX HEVI-DUTY Cartridges mean continuously clean oil ... safer lubrication ... longer engine life for you. Engineered for individual engine requirements and far exceeding engine manufacturers' specifications, they remove more contaminants yet fully protect the detergency of today's heavy duty oils. Insist on WIX for your low cost, engine protecting oil filtration.



**CORPORATION - GASTONIA, N.C.** IN CANADA: WIR ACCESSORIES CORP. LTD., TORONTO



MMA VALUABLE ILLUSTRATED BOOKLET:

MAIL COUPON TODAY? To introduce our services we will send you FREE our valuable libetrated booklet "How to Recognize Rare Stamps," which may guide you to finds of old stamps worth hundreds of dollars! ALSO FREE: 10 big, valuable, brilliantly colored postage stamps from SAN MARINO, as pictured above. This tiny country (area only 88 square miles!), hidden in the mountains of Italy, claims to be the world's oldest republic! Supplies limited — after may have to be withdrawn soon! Only one to a contomer! (Other interesting offers will be included for your inspection.)

Rush coupon laday to: KENMORE STAMP CO., Dept. P8-4 Millord, N. H. Send FREE your Illustrated Booklet "How to Recognise Rare Stamps" PLUS 10 Valuable Stamps from San Marino shown above, I enclose 10s to help defray actual postage and handling. 





WENDELL MFG. CO., Dept. 26.



ROTO-HOE & SPRAYER CO., Box 16, Newbury, Ohio

This scale model is a real one-arm bandit. Designed exclusively for home use. Pays off hours of fun. Ideal for bor or den. Completely automatic. The three cylinders rotate independently when eide lever is putied feelproof Modeled after famous Las Vegas type. Styrene and steel with beautiful gold front Compact 3" high, Limited supply Special mail order price.

Sond \$1.95 to TOY SHOP, BOX P42, ALHAMBRA, CALIF.

# FREE FOR ASTH

If you suffer with attacks of Asthma and choke and gasp for breath, if restful aleep is difficult because of the struggle to breathe, don't fail to send at once to the Frontier Asthma Company for a FREE trial of the FRONTIER ASTHMA MEDICINE, a preparation for temporary symptomatic relief of paroxysms of Bronchial Asthma. No matter where you live or whether you have faith in any medicine under the aun, eand today for this free trial. It will cost you nothing.

Frontier Asthma Co. 462 Niagara St.

762-T Frontier Bldg. Buffalo I, N Y.

# It's Easy to Take Better Photos!

Pirst Popular Science camera book in 10 years! 258-page Everybody's Photography Manual; over 750 pictures Vital how-to facts on cameras films developing dark-room. home movies, accessories more! Only \$2 49. Supply limited!

POPULAR SCIENCE MONTHLY

Dopt, 653, 353-4th Ave. New York 10, N. Y.



Here's News! Ordinary tollet paper makes an ideal oil niter Laboratory tests prove it cleans oil faster and better than popular makes of filter elements. All you need is a simple set of RETLIF ADAPTER PLATES ... and you can start using ordinary tollet paper rolls in your present oil fil-ter. For proof and descriptive literature, send name and address to.

RETLIF CORPORATION, Dept.122

1239 No. Highland Avo., Los Angoles 38, Calif.

packed a depley carrend of 1 des | Fast profitable necker | We be for files

trated circular discounts



You will earn more money... with DERCK'S

gives you miswers to 1000 questions— Quick, accurate—nimple and easy to use

Thirteen complete, up-to-date tables at your fingertipe Instant reckoning without reference to data books, etc. Immediate answers to many problems. For machinista designers, too makers, foremen and ALL machanics 51 " foremen and ALL mechanics 51 "
die 1," thick—easy to carry in your
pocket ORDER NOW



Worth Bill Cimen this price

patigraction or manny back 21 E. 2nd St., Dept. A36 DAYTON 1, OHIO



LIGHTWEIGHT 5370.00

9 5 hp. 4-cycle. 3-speed Foot-shift. Over 70 m les per gal Over 60 m p h. Write for free circular

MUSTANG, Popt. PS 635 W Colorado, Brendale 4, Calif.





"ANGLE" YOURSELF into GREATER PAGEITS-LISS WORK, WITH STRATEX

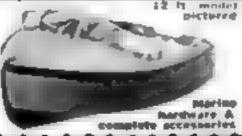
Contractors, formers, engineers should forms, surveys betterfly with separate equipment group, thereby to betterfly with separate equipment superior of yough to be use them to be to be the best of the separate materials assumed in the separate of the separate superior of the separate superior superi

STRATEX INSTRUMENT CO., INC. 1861 D. Hillhurst Ave., Lee Angeles 27, Colif.

Models from 30 25 complete

Assemble poor own best No experience receivery Save 1/2 to 2 1 "fac-tory built" prices Include freeget Prices

and paint New Catalog of all models 10c



Merine Division 2207 FREMONT AVE. SO. INDUSTRIES MINNEAPOLIS 8. MINN.

diam bi destrict? Et dand: Small thed tostet On Iti

> ACTUAL PHOTO

TITAN MESSET 1 2"anight while more corrected Achromatic with the sets 6" and "bet a FULL of POWER with make corrected Achromatic with interview shortgars of VITAL (root and trap Achromatics are COATED to assure farther or sharper research makes Made by the approximal entition of precise on, quality materials a right UNITED requirements, if replains with 2" or in LOW was 3 a MIGH William for rather core straps. \$24.85 at MER POCKET MODELS. 4: Due Tone -\$27.95, "s A.I (brown -\$19.35.

16 × 50 — \$69.50

Weighs only 27 nuncest The ultimate to u gh powered (s), and a family to hould Pasy to Gorna, objective too assured selekter or elekter and make Water Dam a new

phierthe into ansure arighter eleater images. Water Dum Hearly and it mehes and it is being a second of the second 45 50 34 39 50 50 59 10:10 tempert Power
10:50 (FATER FIRE 4 37 or
13:50 (FATER FIRE 4 27 or
13:50 (FATER FIRE 4 27 or
13:50 (FATER FIRE 4 27 or
14:50 (FATER FIRE 4 27 or
15:50 (FATER FIRE 4 27 o 10 5.9 67 50 But on have been CHATELL about the sharper clearer images PHON By T-at D normally Rade in the

Uni-Cooled on the stantage

11

150 4

By Test Describes Rade in its apparent emiliation of previous on

8 x 30 GERMAN \$39.50

1151-

ONE OF WORLD'S LIGHTESTI Whater Weight 1 (11 salt Printer to binoculars from Germany optical cet of of the worse? ("ab) " Water Implemented. Their prefermance will amost you. Intertor metaces of VITAL troop and rear Acknowled on one Charlett or that exten-

sharp, perciar viewing Quality Krost one priced 7838 Weights 16 of a \$48 50 2086 Viewing 27 oc. - Side of 2 2564, 588 50.

6 Tetescopes in one American Wollenonk Instant forusing at his 28s 38s 38s 15 Power to 40x the six Take power take to tick-on gursawork Measures F count 27 extended in a Roat point of turns taken Director to the All 12 ages surfaces (MATIN See 22 in let ) 22 builet holen 200 et Leuth r euse fectulet Federe las FACE

20 POWER POCKET

Easy to hold have to facus Wrights only Threaded Silver Discount At A. META). entitle adval for accurate cange checking, or darken viewless bedeen has Fibble Achemate

plor falls in tested Pla-In pare torque sia de la egia no france. t stains in different modern

WANTED

533.50

30 DAY NO BISK TRIAL If not as infed esturb for full private. Cash orders postpaid a O D a require \$2.00 deposit. Add Federal tax. Leather type, except method with all binordiars.

UNITED BINOCULAR CO. United Hide 9043 E. Westeen Ave.,

Cet

MAH. is taking out of the machine a Plastic Scaling Job - ordered by mail - only ite in material cost brings back \$2 58 to each by mail Capacity of machine \$25.00 profit per hour of eperation.

Out ORDERS and CASH from your mailman—de work in SPARE TIME at home — er expand into FULL TIME besinets. Send coupon for Free facts about the newest

and most fascinating of all home operated businesses. For the first time a simplified machine brings the fabrings profits of Plactic Sealing and Plactic Lamineting within the reach of the small operator. Anyone can learn to operate the machine with a few minutes practice - then with our Mogie Man Plan can get mall orders pouring in daily with cash in every envelope, No cunvesting, no softing. We aven ike \$20 to \$30 a Day by... AGIC MAIL PLAN!

ly the circulant you mail to bring bac Don't waste a minute. Rush your name. We'll send you FREE and postpajd, pictures, prices, details, and of the facts you need to start. Mad coupon or send name on posteard. No charge, Warner Electric Co., 1512 Jarvis Av., Dopt. L-M., Chicago 26, Utionis

Make Thousands of Beautiful Art Creations

TRAYS . CANDLESTICKS . COASTERS LAMP BASES . BOOK ENDS ... ALL IN SPARKLING COLORED PLASTIC

Ţ			H	t E	Ų.	CTR	IC C	œ.,	151	2.	lain	in I	lw.
o		pil.		. 84	۵,	Chi	COUN	p 20	٠, ۱	H.			
A	1	no	CO	st.	to	me,	plea	LDG 2	anh	69	स्तरहर्ष	ete.	detail
-	-	Page 4				4.4	ſ <b></b>		4-1		estati	erro. #1	and the same

Zons\_.



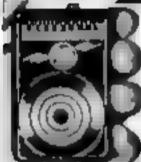
a sof state W to other the forces

\* R No Will D cur e e e ca tien Pitaling

2605 Elmhurst, Detroit & Mich. \*\*\*



No. 1939 QUALITY READING-MAGRIFYING DE BIFOCAL GLASSES FOR FAR AND MEAR ADVANCE SPECTACLE COMPANY, Inc. 537 S. Deerbern St., Dept. [17:6] Chicago S. (Mineis



AMAZING HEW POCKET SIZE

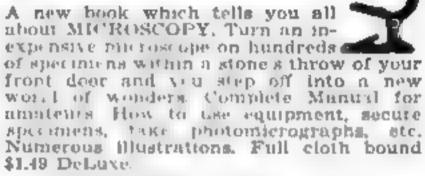
NO TURES MATTERIES OF ELECTRIC PLUGINS NEEDED TUNES IN MUST COCAL
RIDID STATIONS STATIC FREE CLEAN
TONE IN PRIMARY A PROPERTY AND TIMY
SELF CONTAINED SPEAKER PHONE THE FOR REAL FUN AND FRIDY MENT QUARANTEED TO WORK IN the 4 and man to me a specific terminal in a control of the c DEPT PPS KEARNEY NEBRASKA



New simplified method designed for easy application. New laminator X-97 requires no experiance. It's safe! Assures perfect job first time. X-97 comes ready mixed! Requires no curing or evolight. Can be used in normal temperatures. Has unlimited shelf life. Applied in morning, ready for use same day X-97 available in colors, also clear, which can be pointed. Apply glass cloth yourself: Make hulls waterlight. Permonently stop feaks on decks, cobin roofs. Add structural strength, value, beauty. Keep. new boots new longer, used boots in use longer. Save money on upkeep and repair bills.

SEND 10¢ (coin) portage for interesting, Illustrated booklet and detailed instructions. EVER GLASTING "IF U-MAK-IT PRODUCTS 703R- Whittier Street Bronx 59, N. Y. C.

# Wonders Through The



POPULAR SCIENCE MONTHLY, Dept. 653 353 Fourth Ave. New York 10, N.Y.



Buy U. S. Defense Bonds



Walking and Riding Tractors



Standard of quality for many years Ragged to. true Most a I cerettal 5. . H P Kedina Tractors, A machine for every need from small gazden to substant a farm A wanted too s for complete ground preparation and dediciration,

Power take-off attachments for many other, is, See the Same dealer Write for FREE CATALOGS, low prices on complete Shaw line

MANUFACTURING CO. 5 06 Front St., Galesburg, Kanses, 668 PS N. 4th St., Columbus, Ohio

# now...make your own

1111/

REFLECTING SIGNS

You too can make your own reflecting signs and displays... with MARTEGON products!



Ideal for Trucks, Service Shops, Motels, Restaurants, Farms, and similar uses. Now you can have the a trantimes of the new reflecting signs and displays-get sales results 24 hours a day with the amaxing new Safe-T-Glow products.

DIE CUT LETTERS-NUMERALS Complete with full instructions and symbols to construct signs of professional quality.

Specify red or tilver

6 lack

I INCH WIDE STRIPS-30c per fl.

10c es. 2 inch låc og. 3 Inch 25c eq. 4 inch 50c na.

Write for the complete line of SAFE-T-GLOW reflective materials and products.

# SAFE-T-GLOW PRODUCTS

Ben 2467

Gory 5, Indiana

# RUPTURED?

Get Relief This Proven Way

Why try to worry along with trusses that gouge your flesh press heav or on hos and spine enlarge opening full to hold rupture? You need the Cluthe. No leg-straps or cutting bests. Automntic adjustable and holds at real opening follows every body movement with perfort increased suppart in rase of strain Cannot allo whether at work or play Light Water, roof Can be worn in both. Send for amazing FREE book. Advice To Rupturen' and details of theral truthful 60-day trut offer A so encorsements from grateful users in your neighborhood. Write

CLUTHE SONS, Dept. 14, Bloomfield, New Jersey.

When writing to Advertisers please mention Popular Science



Save Repairs! Save Gas!

# SAVE MONEY

**EVERY** YOU



Mile-O-Malor . . . the ONLY instrument on your desh that gives a vised report on engine condition and performance, Warns when enedjustments are secessary to

uveld brackdowns. Miles-per-gollon scale helps you improve your milesge, indicates when you're wosting gos. Simple to install without drilling any holes . . . all directions and fittings included. Sold on firm money-back quarantee. Mile-O-Meter pays for itself ever and ever again . . . a "must" for engine ever and ever ugain . . . u "tune-ups and repairs. Order today.

MILE-O-METERS AT 8 A Charles Street ABORESS

Many Order Serviced - MM COO Orders are shipped within ST hours anywhere in the W. S. A. We pay pertage when payment necessaries aren' Add Ille for special delivery. If destruct, Each hipport-histor is gift-perhaped, with all necessaries and instructions desirabed,

30HH -

**\$Q** 95

Street, of Money

A 2 th and a second Street was

> HALL ENGINEERING, INC. BEPT. 367 MORFIE HAMPTON, MEW HAMPSHIRE .............



# HEN WOODLIFE TREATED

MIRROR INS. protects wood against ever ing the stong warping theck of decay and by notes temp offerties when the lower or theraper gas Mentaelia e intalina 5 CHEMINA gillege 144 Has Wiskild SEE created lyader or repopels 48 PROTECTION PRODUCTS MFS. CO.

Malamaree B-3 Michigan

CAPABLE YOUNG MEN premare now for a

# SECURE and SATISFYING CAREER in HIGH-PAYING AUTOMOTIVE SERVICE BUSINESS



235

You don't need asperience—let Sur's 12 week rourse in MODERN AUTOMOTIVE SERVICE apan the door to a bright, successful future.

Even if you lack experience, ack the world alargest manufacturer of scient fie automotive test egu pment can heip

nutomotive test rou prient can help you make a successful start in automotive service. A critical need for trained men means unitalited opportunities for hiert, high cather young men to carn high faculties in this fast growing field. Ask a correspondence course not merely innother rourse in mechanics—but a practical well-rounded resident school focusing article. rounded resident school, focusing attention on scientific testing-the only way to avoid adeas-work in servicing cars. Quockly get an over-all bird a-eye ploture of modern service procedures. Issuen the basic operating principles of the entire automotive vehicle and how to service it scientifically in 19st 12 weeks build a firm foundation for future advancement. Recommended by leading far and truck manufacturers and approved for Gla.

See	Electric	Corpora	dies.	Dept	PS-2
6123	Avenda	le Ave.,	Chie	190 H	Hüneld

Please send free details on MODERN AUTOMOTIVE SERVICE COURSE

ADDRESS. CITY. ZONE. STATE

Classes schoduled in . . . Detroit Technical Training Conter

SEND FOR FREE BROCHURE . . . ALL DETAILS . . . NO OBLIGATION



Classified Ada unly 80c per word per insertion, payable in advance, Minimum ad 10 words. To be included in August issue, copy should be in our office by June 23.
No concellations accepted after June 15.

# OPPORTUNITIES

## POPULAR SCIENCE MONTHLY-351 FOURTH AVE.-NEW YORK CITY 16

# AUTOMOBELES &

HI-bittenge-Speed equipment from the world's largest supplier Dua, marriolds, finned heads, electric doors lowering sets christic patient about it of items for all cars 1951 catalog 25c adultrated iterature free; Wholesals to garages Newhouse Automotive industries Los Angeles 12

USE 120 octano propane Save conine.
oil. and money Top performance. Unrationed last war Details \$2.05 LPG
Dept. A. 2913 Eugene Baton Rouge La

BAVE \$48 in future repair bills. \$1.00 brings booklet on how to increase your car a trade in value and what to look for when buying a used car Temple Automotive Dept \$25 3558 Anderson Pky Toledo Ohio

CROSLEY Service Manusch the access to your Crosley problems Covers 1944 1852 models 76 pages A man for every owner 25 00 posts and Crosley Car Owner 3 Cub Char to North Corolland Hember a everywhere

HOW to buy new or used cars analyse repair orders, check for hidden charges at in How To Deal With Your Dealer Book fail of automobile repair that temaice this \$1 Bigart \$6 W \$256 St New York \$6

MAKE your own aports car body Priy cater-Pibers as lentruct as New cate of 10e. A resided 25c. Gets O. Life. Box d86ath Night Hostywood Cautornia.

BELLING your car. Get \$700 to \$400 min o Copyrighted Instructions Iveral dealers trade secrets Send \$1.00 today Bianchard Company Box 431 Finding O

YOU can save hundreds of dollars on your next Used Cart Don't be Duped Oct the positive check guids, Send \$1 00. Carguids, Box 3074, Baton Rouge 5 La

200 MILE per galion carburetor patented. Detain free, Curburetor Mesearch Asbury Park, N J.

INTERESTED in autique autienobres Bend for irre sample copy Praction a Moor News Box 254 Eugene Oregon

FENDER and body repair aimple for any are with new wonder tool. Fin large of amail house without welding or solder I also the instructions \$10.00. K & K bales Box 359 Comstock Park, Michigan.

# AUTO SUPPLIES &

"SPEED Eas present Catalog Just out Save 50. 1200 a Items. Pictures, Souping Instructions Send 15c Almquist Engineering Maiord 62 Pennsylvania.

NEW and used guaranteed parts for civilian and Army calls and crocks Largest est stock in America Mail orders Project Auto & Truck Parts Company 184 W 13th Avenue Denver Colorado

DRUSH Plating Outlits connect to a battery. No tanks or shop required, Free particulars, Gunmetal Co., Ave. E. Decatur Libnots

BUY Speed equipment without mailer No se hing Information from Newhouse Industries Los Augeres 22

GM71 Discarded injector parts wanted. Hogen 7:20 Carnegie Cieveland Orio

CUSHMAN & Woord Speed Campball \$7.50 exchange Weber Camp, 4200 Whiteaids Los Angeles Capit

1953 EDITION It a New! It a Different!
Get words largest Auto Access ty de
Parta Ca mog and save money all pages
Over 50 000 tems the adding His visual
Accessories Hi Speed Edu pment Rebuilt
Engines and parts and accessories for an
ears and trucks We have that Bard ToGet part! Jam packed with bargains
Completely illustrated Send 25c refundable J C Whitney 1918-KB Archer
Chicago 16

"ATTENTION" New Model 'T' Ford Farta Phil Palker Unionville Conn

INSTALL 50 watt light bo b in your car Complete instructions 50c No Light Box 255 E Provid Lights

AUTOMATIC key case anapa key from ign tion when turned off Persons, red 3 in tals 5,00 Guaranteed Key Matic Mason 1 Michigan

MAKE \$12.00 each sale selling new inventions saves gas oil filters cooling system Cleans carbon and gives more power five in ormatico Jos Dunisgan 401 \$ Central Ave. Bastimo e 2 Md.

BAVE California Custom Accessories headquarters Buy direct from or goin de materia Electric push button door trunk contersions But Noises Custom Giorgian Speed Diess Up Equipment 40 page calls lost hund rda of phones Bend 35c to Eastern Auto, 3319B Bouth Grand, Los Angeles 7, Calif

LACHAPELLES Treatment Pales ed .
For a bester moint for 13 00 Willie Ferna Products \$150 D Walnu. Dr. Lan Angeles I Conf. for free information

LUBRIWICE - Salety-wheel-pack. Autob 81 50. Douglass Products. 2410 Auburn Blvd. Satramento 21 Calsi

CHECK oil borning piston sign. Seal in compression. Vitage wer perfets give as the last ion as good or be 'er that new r. as Enjoy new quite smooth power. Price 62.95. Butters Vitapower. Box 101 Willow cek. a. 155a.

ELECTROPLATE autoparts, novelties marrors. Easy inexpensive home processes free booklet. Typo Metals, Boa 13-14 FC. Houston in Texas

BUMPER Lite Stripe. Reflects a brilliant red beam. Protects cars, trucks trailers becomes at light \$100 P id 36 at Ramany Products \$00 Detamore at Berke ey Caril

CUSTOM radios for 1933 and 1933 Furds 144 50 per paid Write for dieta ure Nortic Radio Company, Box 342, Evanators I amous

CLEAR A Spark Plug one minute Quick easy method Amazing results Inel actions \$1.00 Clean-a-plug Box 52-5 Kalamazoo, Michigan

HEAR Best Car Radio Speaker O : 34 95 Attaches to any tar radio Com r r K : includes train ich a for easy i standation. Bomel 5101 26th Ave 5 Minnesons 17. Minnesons

NEW Vacuum operated all changer can save you up to \$1.75 per out change on your car truck (ractor or bus Clean Fast Only \$6.55 per paid Hustrated per truckets up request Bender Company 1964 B Bouth Chicago Avenue Chicago 11 I note

Try Clifford & Compression Seat M Post paid Clifford's 1328 Seventh Aurora III

MOTORIST save gasor ne by Varu met lag oversich m stuces. Firs a 1 cars. For Free particulars with a Vacumatic Dept 20.8 Wauwatosa. Wilconstn

WATER Injection". Pres descriptive Disatrated information, Neber Industries Laverne & California

El MINATE Hara desa Coare and Conter Fad a Spiner beau preen or hier plastic Coor Chare on Widel ed or Pirture Windows 12 of areso, can 2798 Postpaid Mar-beaux Pinstic Co Box 201 Bt Louis 3 Missouri

CHEVROLET Owners Stop imppet notice with Key Tappet Sciencers Quality product East to install Complete set \$5.95 Kare Products PO Box 1423C Milwaukee Wisconsin

FRAME these fascinating historica fulls ads 1911 Mercer Racesbout 1906 Pierce 19 0 E M P 1914 Natural \$1.00 Set Motorpr Dts. Box 19633-PS. Los Angeles & Cautornia.

SCOTCHLITE reflector tape, five feet, \$1.00 Fleetwood Co., Box 807P Mt. Vernon, N. Y.

## AUTO TRAILERS

BUILD your own trader! Flans for all kinds litustrated cutaing ion Jim Dandy, Las S. Wantan Wisconsin.

JOIN Trailer Co-op & Save! Get special discounts - courtesses free hewspaper many brushle & services No does no ob aston Write for full information Trail R C ub at America Dept P84, Bos 1346 Bevery H. in Card

TRAILERCOACH biseprints All kinds, Sip on ceach for pickaps Combination boat builty, steeper traiter illustrated catalog 10c. Comstock Trailers, 548-8, Parsons Kansas

# MOTORITCIES, BICYCLES AND RUPPLIES

RECONDITIONED motorcycles and motors Chromium accessories. Complete is the Indian parts Expert rebuilding Past service Indian Motorcycle Sales. Kartas ( (v 3) Mo

MITHEANO motorcyc-s \$10 Midget racer \$45 less engl es Doodlehus motor-scoter \$20 Servicycle \$25 engines \$4.50 up (Matorder on vi fiend 25c l'ir new Directory «Cutalogue Number \$3 just out listing these and hundreds of other hardains in new and used midget care, motor-scoters engines parts and plana for homebuilders etc. (15c by Pirst Class Ma.) Midget Motors Directory Athena O

WHIZZER \$20 Servicycle (good tires) \$20 M do hike cohrectmen hit \$25 Custsman motoracceter \$25 Harrier twin \$35 Hab 2 c 15c 6 at class ma) for catalog 1956 festing many other amorting bargs us to missing many other amorting bargs us to history many other amorting bargs us to history many other amorting bargs us to history many contract the page Associated Box 1764 CS Toledo Ohio

HARLEY Davidsons America a Best Used Hire We pay altipute on materey cles Geneine new used parts accessories for current and obsulete models to id for buselin catalog shill Kris I. Harley-Davidson Pactory Des err. 2491 Published Lac Milwaukee Wincomen

WHIZZERS 520 Midget Car 415 Motorscooter bent 6 ve 56 3 a need account our 338 50 Bend 25c 35c first r ass man, for calalog #23 jammed with secustional barga in in wheelt mot to motor-rue era midget cars, motor-bikes construction plans, sto. Gatl, 528 Eric Toledo Ohio.

REBUILT Casoline Engines, \$17.00 to \$17.00 Cauthel Motor Industries, Temperance Micharan.

POR SALE—10 Reconditioned Harley-Davidson Motorcycles. Reconditioned by Harry Davidson, Factory trained menserving the inspects of over 35 years 20 years a Barley Davidson Factory Design Large which of Octaine Harry-Davidson parts and access of a for Old and Late moder Barley Davidson Send 35c for Barley an Sheet and accessor se Catalogue Bull Trede The Minurcycle Man 7217 Wast Lake Street, River Forest, Illinois,

HUZZZZ ' The Motorcycle Magazine. Lote pictures. Worldwide Coverage \$2.00 Year Sample 20c. \$424-H Hawyer Chicago 25

## AVIATION

STARTERS, mechanical for lightplane engines approved, inexpensive Goodrich, 505 Russellwood McKess Rocks, Penns.

AMERICAN Triplane plane 910 Lillian Holden Box 1814. Pt. Worth. Texas

PROPELLERS Plans Supplies for snow seeples air boult immediate delivery Catalog 25c. Banks Maxwell, Son 1301G, Pt. Worth, Texas.

### ELECTRICAL SUPPLIES A EQUIPMENT

LAMPS—25e brings bargain parts cata-log containing instructions for electrity-ing all lamps, vaces, etc. Gyra Lamps, \$402B Clark, Chicago 46.

Figure War Sain in Cala st-Bargaira Ge ore We dern M. ure to se a . a Hy disance Fumis E a for assembly Your swin, other stema Save, Laday Company, Minneapoila, Minneapola,

PREZ 1912 on C rea att and entaine in-forms on Curd's Will cause \$221 February Burn Name Name York

I AMP By posts — Whydean's any amounts Prompt also ment on all parts for reporting and to diag lamps I had-trated to a wast from Specia view Ca. No. Sta. We stim bits. Bt. Louis 13, 200.

## WELDING, BOLDERING

WEI DERS quetrie rarvous models. P ee literat ra Cristrus o Reder Mg

moult. Us two or welder and a.c. out out Holm t ge e glor We de are where and supplies \$KW stand-by power for ney person of Wests Hobertweed

LINEMEN L. NEADY F or the any Mochastes Propert age almost a country to concern the cy to for he puter annually a tech forme to the more buck gre solve \$2.00 pp. Guidwin he had be a feel Tampe be

A.C. Welders, & Sixes, Lowest Private Press, Bulgerson's Serv Canton. Kun

### MACHINERY, TOOL SUPPLIES, ETC.

PILES: Bet of 10 asserted strapes 2 .c to Twe to leich Proposit \$2.50 Part of 626 Wyles Ave Break yn 11 New 3 rk

special, tools for woodwork of ma shines also motal turning attachment for Biopsonith, Pres forders, Distance, 7301-E it W 19th Avenue, Miami 28, Florida

MOTOR driven future Hair sour sens al Keen Bage trops & must for al. or pa limmed ate. de un't blooms lindustries. Predor a Print vacio

GEM Toomakers Diemakers Indicators Model 222 ( 801) \$19.50 or Model 333 ( 0005) \$27.80. Hybrandt Company, 4160 Euclid. Cleveland 3. Ohio,

PL Milette Pres wholess a falsowice of all min ne special es N.D. Cu. Box 300. Bayonne. New Jersey

BHANG how but his methable mark he Soul Civians Pampe, Begave \$49.50. Har y Naco Produces, mpany 14869 Livernois.

at he w unge three threads per inch and that ew a res F ee de a. a Fans Lab-aratory TIE Degwood Road West Grange, New Jersey

BELF O er for electric motore 3 fee \$1 00 United States Petrusum Co. Dept. M. Clifton, W.J.

TOOLS for the Craftsment Machin ata Tourseases Shedistets, and Las of men To rece on proper era are Please state occupation. Jose Detroit Co. Box, 4822. Detroit of Michigan.

## ENGINES, MOTORS, ETC.

WINDING Date, Esting 225 motors, single and three phase. \$1 90, Motor Data, Sox 7622. Kansas City 2. Mo.

AUTERNATING Current Generators 150 Watt \$10.50 5000 0 05 3d or rp 25 horse 0.5 % 522 1 625 Beslet 1605 Milwanken.

ELECTRIC Motor Winders, send for bulletime of motor Winding and testing equipment Motor Industries Quater In

REBUILT Gasoline Engines, \$17.00 to \$27.00, Caumel Motor Industries, Temperance, Michigan,

## II BOATS, DUTBOARD MOTORS

BUILD mu and engages with Federal Conversion Kills Federal Marine Maters. \$611 Collage Grove Ave., Chicago 19, 211. FULL size, set to shape heat patterns there are the Tig in feet Countrained B and a Boat calang Me could How to Buy d Books brok & 80 Polywog houselman Plans \$10.00 Circeland Book Simpriot Co Dept A TI Circeland 4 Onto

NEW aged report martin motors Mathe course one, it time Free Catalog Studen Marine Bully Dept. 21. Cudwater Mien

OUTBOARD Meter Parts New Could for al. makes Bead state, for pice quer tailor isti g parts meded. On heard Missor Martine 220D State Street, Boston Massachusetts

NOW Pas er Than Beet Champion Boats the course of hammens been avail and to you have to red place energy assemble his or day to a right course book average himts ( \$ \$0 ders not beard and room of well 350 today for mail corrd contrated cotacque Chart on Post 2526 W Lith St Long Basch Cast Dept 23 F

MARIAN on very one for Post and Jees o g Co 9 24 Bland St. bette 2 X J. bette bette bette by the by the bette by the bet

pastic cover, a bilde contains and pastic Complete instructions New You prices Industrial Plastics, 3007 Harrison, Oakland 11. California

MARINE Conversions, manifolds water pumps that me a secret ted reve se grain etc. meat complete his a the man-ter. Borr Man e Producte Co. 2 06 E. s. st. r. Ave. Pr. adeta a 34 Penns

COMPLETE 12' hoat kit only \$50 00 semi-vee car-top Wooden parts accurately cut, easembled frames, brass acrews. Write for Uterature, Pennsy Woodcraft Indus-

PERFICE that may be Posteries Piberglas Permaners pro-er son New rature 25c Gem O Li s Box 6864C Borth Monte. wood. Co storma,

KIYAK Boat Kits-Send for free information and prices. Skyjet, Box 315, Garden City New York

PERMANENT Bout Protection—Use Custogias (Liquid Plante and Glass Cioth) A is P 16 side yearst to not the net and being to Prime passe of at it Lighter than trums Makes beard stronger of maneury lead-pend ret proof in alth proc. Whather-pend Worl rust corrule grank thatfected by game. It uts ascential and the exhis pun A mi med for and ig seats patch-ing cauthing free Funity Marine Di-rie in Neut MCF 182 Cantadra Wash-bling H.

REBUILT Guaranteed Outboard Motors at creatance piers I to It M P to direte a stock M.c. 1855 37 page Ma .ne t a rog ford on a 300. Masters Into W Chicago, Chicago 19.

Pl And Intomed a theory respects.

der sers and Wood problem we did steel, Advise requirements John B. Claub, M.A., 320 Kermore Bay S. sage (20)0

# 18 BODT-BUILDING COURSES, 21C JITSU & ATMUNTIC EQUIPMENT

"POLICE Jim Jitms," "Beientiffe Bon ing Buth courses \$1 posts and Books.

ACT N w Have a Muscular Pener-Pucked Sloky No specie in catalish needed 7 untrated Coules Complete in plain wagge New outs \$1.00 h Murphy 6a7 Te-man Prace Wastegan I don't

BARBELLS toy to assum Equip Boothern Batter Co 15.0 E Cary Richmond Va. FIFTY propen exercises 400 CAUSIGHOU. 318 Cherer Lane #1 Louis III Mu-

BARBELLE, Durnbbelle, Exercise equip-Courses Free booklet Good Barbe a Ch. Headang Perca

### FIRED GLASSES, TELESCOPES

WAR But - us Barguita Bitorquark Tea-Prisons Britanita, Millacia of Leries, Prisons Britaire Eyepieces Objectives etc. Mala 16: tor Bas College Ch., Bend COCT 6-978 description. so for which CN 10 piece Lens Kit and big Instruction Bookset. Edward Scien-

180X TERRESTRIAL telescope with tripod Extra eyes oce Clear erect images pueren eed 5.0 00 R terade Telescope Co., Riverbead, New York

RAYE' Save! New Bimoculars! Proc Cutalog Free Book How To Se set Binoru-Orests Pasadena . Call.

AMAZING p. sea binorulars, telescopes, est. secupes Free trial Folder Binucular Selecting uplical calacter free Frenties Importers Merc by Bidg West Los Aner es 25 Cas ornes.

PREE 40 page 1 color rataing' f7 difterete. made a United Binocu at \$ 1043 ff. Wer etc. Dept. A. A16 Enicaco 30

Prowestril earl terespen maly made to see erecut focusing take and that out one for making tox 100% 200% and 100% terespite to 80 Riverside Telescope to Riverside Telescope to Riverside Kew York

REPLECTOR treescope has Presisted PLATECTON terescope & to process the control of the

PREE Catalogue Thousand was surpics etricar by sains Lensey Prisma, of correspond Binach are etc found Binach are etc found Binach for 10 Lens Hotel at Set and Project backet of Jacobs and West Marrick flood. Lynbrook. New York.

PARADISE for hobby and Microscopes binoculars, telescopes Free catalog! Nas-sau Optical. F West Greenwich Ave Roosevelt. L. T

R NOCL ARRETT receipes Microscopes Terribe to see 22.85 up Request Free-Mister heroig cale on Criterion, Mart-to d Con Over R 2

Prop Estimates-Northwest Instrument Instrument Company Lto., 2313 Th d Avenue, Seat-

MEPLALIAND Temporer completely haven bed tox \$70 h Guaranteed Observatory clearment. From information. Skyscope, 474 Fifth Avenue, New York 17 ANTRUNCATICAL Books Star-Atlanes Merbers A Lutt, 42-16 22nd Street, Elm-Hurst 72 N Y

CALANT HAS COMMISSION TO PRODUCE COMPLETO with 4 It should 45% lives 48 000 a on ers has power tirut y son gustanteed to be to be factory Bullout Science dervice for the form

Primable to their terroup tens bit Period Jesses as a fue ain for making grant telescope \$1 00 Telescopic Company Majorth se \$ 10 T an a literal

GIANT telescopes and telescope makers It to Don't buy utill you make our or eq. 1 to Perfect mercies when Te- the mailtigs Buterhead Telescope Co. Calterton & N.Y.

200 Thirt E nonepowe energeopes 20 00 profpaid stere it id direct amount to rea ye cutterns fire F & Oprine 2444 W Beverly Bivd. Montebello. California

BINGS "LANG Lowest prices \$430 17 00 guaran cod Triencupes microscopes First to a of A sizes Zon's Bauer taff bases 4827 decuted B d De rift's Mark

ASTRONOMICAL Telescopes, Bardon, Do 1700 Serv. St ciffe, Martincopes, Mahew York

Prowerful astronoment Telescopes party made Kits tron \$2.50 up Suffak Science, Riverbead, New York

## SPORTING GRODBS, GUNS, TRAPPING

126 PROPUSELY Quetrated pages antique pir la source despris a mot eta, New 5 ct 21

SAVE on Ounsmithing, Jap Conversions, Scopes, Loading Tools, Catalog 19c, Course Arms Company, 587 Perris Street, NW Grand Rapids, Michigan

Aroud For ammunitude BAVE Mover Complete Reseasing Handbook 73e postpaid with Free catalog listing supplies. Precision Tool & Gun Company, Ithans 20. New York.

with our moids. Proc illustrated book et. Reading Instrument Co., Non 78. Reading. Pet a m

RECOIL pads. Close-Outs. Standard price \$2.25 While they last \$1.25 Small is a un.y Ptay Wholesale Curporation. Globdad 8, Cadlerbia.

MINE Raising information free. Com-Lake Superior Mink Parm. Supeblete. TIO E E.S W SCURISION

THEY RE!! Yours to the limit-Every trip-with Surebite Live Grube-Angwhere -200 Postpaid \$1.00 Keeps Weeks SureBite Live Bait Torrance & Caul Dealers Inquire

MOLDS Handled and Hinged for Fishermen to make their own 5 hers aga Squids and Casting of Spin a Lures Entertaining and profitable 400 a es a d stress from \$2.00 up Special in the made to order Free calaba Sweet a Mords Topumanda J New Y h

5 000 BARDA NY Frentitte binich are War re rs ca and 50c Smith Museum.

JAP r net a sering American abeta lo Michigas

DID you ever try fly-tying? Make your own fishing jures. Bell them too' Begin-ner's kit is only \$5.00. Many other kits t) H I compson, 235 Walnut Avanue. Eight Thation

FIRMERMAN Fish-balt-odours get more fish Four terrific gypsy formulas for \$1.00 Ayres, 101 Station & Toronto 12. Ontario

IMPORTED knives Write for Litaltrated era are J D Camton Mt Com-

64 PAOK Hastrated Barmin packed rd arg 8 30 Westerin Ke uckies In-dar Reice 8a ids Meda a Lagers Mauseth Change I is Access-ries Agra-m en 201 Wa our in Yinkers JA S Y

thanks (ounset to a leasure and an-Da itt th 42 3 N Ha iem Chiengu

PISHING Plage-Write Blackstone Balt Co 344 West Dayton St. Madison J. Wis.

POS revis ern Sure Grip Adapters improve shooting. Regular price \$1 75. W to they is Suffer Imperects only 0,00 W to for ca and Fray Whosehale Corporate o Chandain 5 Cautor in

Buit D Mississipp. River Catrish B. 1-trap Guarni red Detailed plata 1) 00 Commercial Fisheries, Box 372, Gutten-Berg Iswa.

OVFR 500 pulls, modern, obsolets, List 10c cum. Ed Howe, 36 Main, Coopers Mills. Ma e

MONEY cheerto is reminded if I a to Manie Guest & raich more 3st than se in aims 4d cents each three 5/2 \$1.06 Post a d Paul Cobie 25645 First Birect. Wen att One

PRECISE IN Keet Kaster real thumb Brake disk adjustines 1 3 spend holds 500 fee of a 8 Best of rig stan ess cee at all \$2.88 Ke Don De t A 250 North 38 a Bires Bratis 2 Washington

Spin a Lustrer suns the Its etrangue h in-Fishing Equipment Association F ve Membership 1046 South Olive Los Angeses 15 Cadlorana

# CAMPING EQUIPMENT

TENTS, campaig equipment, 100 page free chinague, Mor-San Sales, 10-21G 50th Avenue, Long Island City 1 N. Y.

# DOWN, BIRDS, MANSTERS, RABBITS & PETS

MAKE B.g Money! Raise Chinchilla Raby . Cash Marketa Supplied, Write Today Rockbill Ranch Scherwille 16, Pa.

YOUNG Parrots-make fine Herh M . er 1911 N 1 (buch Texas

RAINE Fish nurms. High y profitable. Ilhow and book is explain a fairt of and of marketing so up of 250 O ark World Fairth 5 William Springs M. savur)

ANGORAS, Chinchillias, White Giantel World's most profitable rabbits! Catalog free Grinstead a Edwardsville Illinois SALE Tame Red Squarrel Breed Striped.

Dewey H Buich Can etun Ve mont BAMSTERS for pets or profit Free Lit-erature, Murray's, Box 512, Ortumwa, Jowa

HAMSTERS Delightful small pets Free illustrated details. Anderson's Hamstery 15 Oneids, Pontisc. Michigan. Dept. 20

STANDARD Rabbit Journal B-241-X. Milton, Pa. Year \$1 00. sample dime. be-ginbris manual 25c

GOI DEN Hamatern Pedigree Breeders Lab but My or Pet Swek Shipped express Anywhere, Price list free Charles E Bowser Smoke Run Pa. Dept. H

## FROG RAISING

FROO Ra str g Season fust statting Det to year a erga New book to a h. w. Demar sa Minigan

### FARMS, OTHER REAL ESTATE

PARM Rauch Outs riunates Pavorable colider and Warb gratt Mittelette Mill. idaho Orrest Noth Dakota Lita utt to its description 6 sec y at 1 at at at at 3 W Haw 130 Northern Pacific 130 Northern Pacific state h) St Peus I Mint

LALIFORNIA Ranch Lands 50c to \$3 nere m amaim had ba m raich bunt hib retire ioc hings is ustra ed a d ca and not be hand the La d Baim. B., a 2500 BK, Hur bound 25 Ca

Fig. R. DA Beckets For new glaca-tion of Listing 5 acre Patry Fairry about 60 to en from St. Pere sourg. Fire 1. historia de farm or can per de lo her historia de bot de bot de deep ara for le de per de la deep ara for le de la deep ara for de la deep ara for

HINOUT PART CA most free Parma Homes. Businesses, etc. Over \$200 Lar faint Searched hi Maries World & Largest 50 years service Stroot Re-

PLORIDA H abway Estates 4345 Par Tracts on US Highway In famous Panama City Pleasure Resort Aven. Pluest beaches fishing hunting Winter gardens. Desirable Community. Free Book.et Doug-las Wood. Bux 871 Houston, Texas

10 ACHES Missouri Land, \$75. Warrably Deed, John Calvert, Plant City Florida SELLING village houses like rent, nothing down Perry Brier Hill 29 Penns

PARMS Homes Bungmersen breucht sold traded at the e e Free de ails Mr Tools ha he bear of ledge

# TREES SHRUBS, ROOTS, HENDS

REDWOODS OF Without Parties Dehar big his go six cones. Nove to Discouoli Counch to aranteed Hutry Empire Se Ttera 585 Me do Ave Barita N sa Caul

## POLITRY & SUPPLIES

RAISE pheasants on \$100 week plan Little capital and space can make you in-dependent. Pres details. Ovest Central 5 1 Cas C dumbus # Karinas

## IT PROFITABLE OCCUPATIONS

hi, dependent he secure have your own preffabe business early \$20.00 a d m re a der meh it breut al fen se aug tan pa at home No eq ment needed It us rated course teac es you quek y Cou se part) ratalog was desais no ce and ou y 52 Charon Co Dept 206-Ad 27

[301 a c 01 ( teag & a Re A to Make Mot er With Home Workshop deer bee amar ha mero de used by hundreds of success a craf sere. Te a what to trake it was no wasted so on put a are my W to a wre for de tar a C a tamas. 21584 Worth 81 NYC

Whelesale thousa da hattoba y advertised prod eta al big discount ? ee Page. W. Newscondord American Buyers 628 S Linden, Buffalo, New York

DATECTATES has been best best to be best of the Desert to Particulars free We & Was not F 125 W 66th N Y 26

\$10 Pio PROFILIS Y ait own that rider Bus hess No apates Risk Success P an w. to 52 Pree Write tedar Webs et Avenue New Rochette P 13 New York

25000 PROM half acre growing Ginseng crop bought. Particulars 15c. Associated Growers Special Naturba

ber id 30, new pr able e territore. Many manorder Includes confident a o structions for start g wholesale but a service Deumant Business Surveys 83 T Deumant Ketmore 3 5 Y

SAIL Ho! Merchant Marine Opportunities, Pres details' Senways But 1231. Ba). timore 3, Marvland.

\$40.00 WEEKLY Make growing mush-rooms Don to Faret 331 581 Free spaws trab Order New a American 148Y Younge Total o Canada

WANT A Diesel Job' New Opportuni-Miner We can help rom Qually Ton a Desc. Tractor Hears Equipment Divi-s a fore state Tra 1 a Service Dept. B2 P Port and 13 Oregon

ADDRESS and mail postals. Make over \$50 week Bend \$1 for instructions, Lundo. Watertown, Mass

MUNICOMS (\*\*- Wa b 10) barrels Manureless process 56c, Spawn \$1.00 Gordens, 553 William, Winnipeg Manitobs

WANTED! Intelligent investors, and sell chinchillas part time 4900 month-Richardson Dept. 563 45 Lucille Manreester New Hampacere

"AUCTIONEER S Fitch!" Comp rie Privet Fitmas Cash t Rush 6 0 00 Mart" Box 575-A Hollywood 28 Calif

GROW Machrooms Colleg shed, and pay \$3.50 Lts. We paid Babbitt \$4.165 in lew weeks. Free Book. Washington Much-room Ind. Dept. 101. 2054 Admiral Way Senttle. Wash

RAISE fishworms may profitable com-plete instructions 25c. Hullman's, Rives 2u c bit Metigan

EARTHWORM Breeding is may First get stor An East warm lurned 2016 Lie "Earthmaster Dept 15 El Monte Cal

WELDING Pays 566 Learn easily at best equipped achool in country Son-profit School Wills World training O t approved Write Hibert Trade School B + P & 17 Tray Ohio

NEW Interprets Prastererating Profitable home business Pres information Merts Plastereraits. San Bernardino, Cal RUST absorbent Preservative Roof Cont-

ing Luster-Kate 19417 Derby Detroit Mich RAISE Ginseng, Roots bring fortunes. Pres information, Pexter Pa coopus K Y

BOOKLET on breeding and raising ca-Kengie 1310 8th St. Abany Georgia.

EARN \$7 400 \$15 000 annually in factinating Traffic Management. Route to top executive position. Free details. Union In-

MANI Par Ti RE Bearines plaques sab-trava mane cas fire ble made low dust. Par er Bix 311 Out and California

MAILING Post Cards Offering 301 ig Merchandise is pro' able Every-Ma Service Darser Illinois

## BOOKS & MAGAZINES

SPARETIME Profits Taking Subscrip-tions All Magazines. Wholesals Catalog F cc Cases Agency Wes rd 1 N J

BiG Catalogue 1500 bargains send 10c Books 3100 Ocean Parkway, Bronk yn 15 GOOD Used Books 50c St og trings at Ed tions Dept PS Hamp-

PREE Su secrip for The Americana Rage No feet N Purchases Required Se d year name today to secrit free nessignator Americana Earle Contains best 1788 for valuable information Mail Order Division, Americana Corpora-tion Dept. 286 335 N Michigan Avenue

BOOKHI NTERS! All Bubjer i Send Wa Ja set Book Service \$20-K East | 0.5 eet New York 57

ATHEIST books Catamena free Truth Serker ( > 38 Park Now New York &

AMAZING new Science Fiction tary Book Baranins, Send 6 me

CHAPTETE book muck tech cal new used es ab shed 1900 Crist Book Shop

NATIONAL Geograph & Magaz nes 1888-1952 Any Issue Period cal Service Bus 46, PR Wittington Delaware

BOOKHUNTERS! Scarce, unusual, mis-reflaceous books supplied Atlantic Book Service 2 Lawrence, Charlestown 25, Mass.

BOOKS, self help instructional Many mint editions, collectors (tems, Pres list Mutua? Section 261 Wilholt Building Springfield Missour;

TECHNICAL Books and magazines of every type our specialty. New and used Bend wants, Bern-Art Technical, 238-33 116 Road, Elmont, New York

MENTAL Action Maracies." Tremendensity valuable information, \$1.60. Guaranteed Scientific Information Service 1756 Houghton Ave. New York 72 N Y

### 4 HYPNOTISM

"HYPNOTIZE the First Day" Send for this course today \$2.00 Lewis, 4000 Lake Park Chicago 15. I. Innets.

25 LESSONA In Hypnotism Be Card Tricks both courses 11 postpoid Broke 1400 Ocean Parkway Brookeyn 12 JOIN Nature at Guid Hypnot as Detens Hyproduses etc. 10c Guid 645 Harless Derectore 11 Manager userts

BENHATIUNAL new book 10' Hypnotic Methods written by professiona, hypnotust for heginzers \$2.00 Hype of an Headquarters Hazerstown Mary and

AMAZING record Hypricities transfers sorted to you testructure \$3.95 p.d. intermetion free Hyp.so Records Dept. P. P. S. 403 Hermina Beach Co.ff

PREE Ligitrated Hyprotism Seifhepnosis Catalogue, Write: Hypnotist, 1334 Wishirs, Rollywood ITP California

HYPNOSIS and Self-Hypnosis, complete course Free Setalle, Columbia Compary 3044 A Rullywood H vd. H v /\* and 28 Cal

## SIA GAMES & ENTERTAINMENT

ORIETTAL Windows system of adding Used throughout Orient Mos years Pull Instructions 81 80 Address Wasdom 8024 Lave and hest Call

LIN-O-Fun game, joker nevelty just life. JRS B162. Alviso Catif

### MAGIC TRUE RIG. PLZZLEN, R.Tc.

MAGICIANS. Clamblers books, supplies exposed. Catalog jos. Book, Son 671, St. Louis 1 Mo.

and TRI. Kri Dong as lammed 120 page Catalog only life Pastest service to me gictons for 30 years Send 10c today Dong-las Maniciand Dopis, 2. Daline, Texas.

MADIC—Partor Stage John Supplies, Lower Prices, Glant Catalog 25c. (Refunded), Top Hat Magis, Evanstee.

PREE trick and large blustrated esta og - 35c. Lerro's Magin. Sitt Firth Avenue. Brooklyn 9 M. Y.

MYSTERY Mirrors—Can see through one way, not the other—de per eq in.—Minimum, 81 00—write Box 500, himsoule. Mantana

VENINILOQUISM Se 'taught My quick tony lessens, 25e, "Ventrille," Calklain, Teast.

Back Real Cay stud Hawas galors to at Johnson 414 McHas W ambiguous N C ARNO 10s for Catalogue of Tricks. West

Texas Pun House Box 7839 Odesse Tex 2508 TRICK Catalogue (522 pages) pothet, parlor stage World's Pinest Magie Cetalogue \$2.08 (do ar trick laauded free; Kanter a \$ 1311 Walout

Magic Catalogue 53 00 (60 ar trick Intioned [700] Kanter & 5 1311 Walnut Phi addphin T Diark and Penny Trick Petiny changes into Dime Instructions and accounts the

DistR and Penny Trick Petiny changes into Dime Instructions and superstant 35c Jack Eastwood, 8841, Jesterson, Challenthe, Only

BE a Magician Large professional magic estatog of latest tricks like Ireland P 106 North Dearborn Chicago

MACICIAN D Bustrated catalog and free trick 35c, Terry's Magic Studio, 1921 -64th Street, Brooklyn 4, New York.

## M COIN COLLECTING

OET Profit and Pleasure in collecting old soins. Send the for \$4 page insufrated poin entained You is be despited with it fend for it now B. Man Mehl 374 Mehl Building Port Worth Tunas Largest rare soin establishment in U. S. Katablished & Pears.

PRFE: Pursign oran banknote and Com-Collectors Hustrated Catalog to approval service applicants, Send & postage Talham Coll. Co., Springfield-16, Mass. OLD Movey Wanted Will pay \$100 00 for 1304 Dime S. Mint all 00 for 1312 Liberty Read Ficket (not Buffaio) Bug predicted paid for all rary pains field to for Large Cum Folder May mean much profit to you Numismatic Co. Dept. 26 Pay Worth Truss.

WANTED-1894-6 Dame Pay \$500.00 Certain 1813 nicks, \$1 000.00 1001 S quarter \$30.00 to \$150.00 Hundreds of others Knew their time value Cutspets to terminated entalogue The Worth recin Curporation (D-301) Boston & Mass

U S \$2.00 [Quatrated coin cetalogue 256 Shalts Sait Lake 10 Utah

FLYING Engle cent and large cent. \$1 Helf cent and two cent \$1 Delmago. Ben 1127B. Wilmington, Delaware

## STAMP COLLECTING

AMAZING Offert 300 Cr. ted States stamps including commemoral tree are made. Bigh denominations to \$3.00-Only 10c to Approval Apparants I restrained Bargain Lists free, Mystic Stamp Co. Dept. 35. Cainden, New York.

PREE-Complete set of Pamous Americans. Place. Parks and Presidentials to a roval husers. Send De for 12 of the above stamps plus full particulars. Triboro Stamp Company, 143 Haces Street. Dept. 206, New York 28, N. Y.

1 000 UNIQUE Optorful attractive mounted stamps ic-3c each. Rushed. Ningura Stamp Co., Ningura-on-the-Lake 72, Canada

100 STAMPS For Only 18c? This manmoth value includes Airmain Pirt has a Mampe from strange could et enta-puring up to 25c each? Also approvais Mystac Stamp Company Cambeo M New York

POLAR Bear Triangle Client George Washington his Coursed Schader Are to Triangle first American commemorative Cornea Device Island others Exerciting free with approvals, Capital Stamps Little Rock 18, Ark

VALUABLE Airmed book plus gorgeous word wide airmed enter too live includes \$10,000 stamp. Seppeim scarce triarese many others with beautifuly illustrated book only too with the tee applies his and betyein its a Jamestown heamp Co., Jamestown 187 New York.

FREE Stamp Collection: 166 different stamps from Europe, Africa. Asta, Scandinavia, Balkana, etc., 3c to approval applicanta Tathum Stamp Co Spranghest se Massachuspita.

300 DIPPERENT, including Roosevelt triangle, Se to approval applicants. S. Ar-alon Stamp Co., Springhed Mass

PREE Scott & International Albam Other but premiums Plus perfections with approvals, Rayman, 88-X Hassay St. New York 18

FLAC State 0—Free with hygrade U S approvals. Wemigemen a. [83] Patterner. Chicago 13

121 DAPPERENT Statupe 25c' for other Early Consent Newfoundanid British Colpower Vatican Red Russia, Bitler Heads
Indiah States Animals, Armana French
Colepion ra-tises unasquis Every stamp
different Bare bargain only fice with our
Bargain Approvate Money back guaran
ted Riagara Stamp Co. Bingara-on-theLake 62 Canada

FREE' Powerful Magnifying Claim for le Post Bargain lists and tuor reals Jamestown Hamp Co. Dept. 202 Jamestown New York

OREAT Free Offer Weird mosquite stamp that ling beyon tace corpous or clid enter a) nature fittement adaptive dismond alimail, stamp a bama all to out approval buyers Bell Stamp Service Light W 6 Bes. Ca sforms

46 ALL Different U.S. Stamps includes 19 Century Commonweatives, Airmain and 6,00 Blacks Only 10c Approvals Whielf Co. Box 211M. Port Chester N.Y.

PLEASTRE is yours for prunies when you select from our big books of 1 000 stamps. Clean and neatly arranged stamps for your lefection Scott a catalog number and price under each stamp but is go discounts allowed Write coday and waith your policetion grow Weiterine Stamp Berrine. Dept. Det. Printport. Michigan.

NUDES Set; Colorful approvals—19et Atlaz, 2030-P Elsenhower Racine, Wisc.

BELTER Otade U S or Poreign Approvals Ocean Stamp Co., Box 64-F. Brank yo 22 New York

SENSATIONAL Quaranteed Barrainst 1 000 Different enlette's attractive in united stamps | & 3c such Rushed immediately Staguta Stamps Hagara-on-the-Lake 12, Canada.

I is CATALOGUE white our supply tasts on many over stocked foreign stamps. The them on approval Frenchess on purchases Roseland Stamp Co. Dept. 5-E. Spring Lake Michigan.

MINT King George Coronations from 4 different British Colonies only 16c with approvals. Walter Welles, Box 1246-V. Church St. Station, New York 2.

Fight Lion Earthquake triangles, Belebut lands 25 different, all 3c, approvals Hathaway Box 165-6, Garden City N Y

17 DIFFERENT U. 8.—256, Approvals. Utechts 1143A North Kee,er Chicago \$1

Sibley Mendou, Mass.

PRES Colonials, Old U.S. with 160 pictoria' approvals \$1.00—Bristol Stamps

DEALERS Wholesale satalog Postage to Frankson, 1621 Queensbury Baltimore.

Maryland

one DIPPERENT gives free with appropriate Postage Sc Windsor Stamps, 1635 E 4710 Page Chicago 27

BIG ber mixed stamps Enermous quantity \$1.00 Longacro Shop, \$630 Sixth Avenue, New York City (1.

THREE big packets 25c. Sensational exchange offer Kautman 73-51 Ball Blvd. Bayalda 64. New York

CAMADIAN Collections From Includes car's Voltan Issues - Jubilees High Values - Commemoralises - Special Issues - Newtour dan de Pictorials etc etc dester with Philatopic Magazine all free send de postage Empire Stamp Company Dept. Fit Toronto Canada

ASSORTED stamp packets by countries. Pres list, Box 125. Summerdale, Pre-

LOOKING for Bargaine! Try our is a 2 at revals mounted in braks of 1 000 We be leve in both quantity and quality Pret 17; a 1 actisfy, Clark Stamp Oc. Dout C 2 Muskegun Beighta, Michigan

PRET Behavelpur Jubilee set to approvate from a language for the former former for the former former for the former former former for the former former

OLD scarce U & seconds on approval. Such is detective burgain prices Rearnte d Colombial Station Newsch & N J

Pickin Sample—Interesting Informative Disstrated: National States News, Anderton Soc. & Car ... a

60.000 STAMP Grabags 256 each Ander-

1875 DIFFERENT worldwide pictoria a atribut's ate \$1.25 Ontrow Chula Vista California

TH.RILEN deferent hear'fful triangular stamps, let Approvals, Frall, Hackettstown, New Jersey.

"WOW! 203 Ail Different Oermany ISc."
Zeopolina, Semi Postale Admans High
Varues Big bergade lists and appropriate
meladed Jamestown Stamp Johnstown
Sco N Y

107 IRON Curtain Stamps' Semetional offer includes stree periodic a from Busine Bullingary Poland Corchestovable Bulliaria Romania East Certainy and S., berian-lands cut off from the Western World by rathless Russian Communicat Al different Our booklet H. w to Recipite Rare Stamps Included from Rush the today Offer Lamited, Echingen Musical I-184 R H.

UNITED States—40 different 10c; 46 different Commemoral ves 25c. No approvate Seidenberg, Appleton 844, Wisconsin, Printy Approvate by country M. M. Morraing, 162, Parmington, Ark.

19-1-2c APPROVALS, Bargains Ca. 1 lore! Cole 43G Ranewalt, Buffalo 21 N Y

DIANT Approvals Thousands Different at it and 2c Wahl's Stamp Exchange 7006K Patragut Ave, Chicago 31. II.

MINT (Unused) United States approvate Patrick Agencies, 3634B Central, Indistance to 6 Indiana

SPAIN 100 different lot to approval applicants. Moreit 201 Penimore Street Brook, vn 24 New York

WORLD'S Most Beentiful Approvals. Write' Hall 28 Woodman Worsester Mass

OERMANY Austria Prancy brastiful mint approvate for International Part II and Master Global Albuma Henry Paville Box 2005 Madison & Wisconsin

100 DIFFERENT 10c 1000-51 00 5000 Mounted \$12 to Ransom, 1313 Pontisc Ann Arbot Michigan

MAGNIFICENT! Nonetsenth Century
U. S. Plus Civil and Spac at War Resenues. 20 Different 10c In Approval Approcanta. AAA Stamp Company Areado
Suilding St. Louis 1, Missouri

WONDERFUL Offer Seven complete mist seen only the with approvals. Resch (826) 4447 Kenmore, Chicago 46.

MELECT packet -10c Bronomy approvate ale accompany Empleymenth 1781 Byon-more lette Mante Indiana

ec DIFFERENT U.S. 30c with approvain Falth, 1336's Westminster Ave. Assembra California

U. S. 50 different including I airmand is commemoratives like. Approvate. Sumset Dept. 305-S. Hox 47 South Cate. Calif.

APPROVALS 150 up from 33.000 collection. Chur Box 345 Huffale 13 New York,

PACKETS world different 2,000-83 PC. ]
3 000-34 00 \$ 000-84 00 10 000-84 00
20 000-300 00 P D money sedem p.com
[hearty Missistato Best 2012] Natural
Bridge Station, St. Louis 15, Ma.

UNITED States approvals Select copies used, mint Kingsbury So Woodbury 2 Vt

100 Day MERENT Spein 23c Panny approve a included, Reed, Box 200, Chicago to I about

OPPORTUNITY! Dorreus lot with Triangue. Gianta. Midreta. Flags. Airmaila
and Ra road Stanigh Asso Guerra
Brunet Morgolia Surawah Ele Freryth 4 on 2 lot to approval app Mattis.
Evden Valley Stream 13 New York

ARMENIA. Hongkong Sam Ukraila Mangolas. Free with Apprivate Minister Stampeo. Box 2226, Miami 46, Plorida

ECONOMICAL 1-2s Approvals-29 000 Varieties! Gaines, 716-B South Bisteenth. Mat one Install

PREC 2 Hungary diamond stempt Plus 2 Senmarino triangles, to new approval applicants, Moumbiow, Box 278D. East Northport N Y

50 YEAR Old Collection—U. S. Classics
15 Helected Old-Timers each 50 or more
years 14 Most of em missang in rem
the biggest in sections that it of these
uniques. Consider for less than it each
All 7 7s I r just ther With your request
int approvals Jaro States Co. Ben 344-E.
Church St. Arhen. Hew York E.

50 DIFF Finished 10c with suprovert Carroll 8. R 1617-C Sprague. Spokane Wasti ston

SPECIAL & Different U.S. Plate Blocks \$1.00 with approvals Wm. Euchi 3125 Last K. Taruma & Wash

BOUTH American Approvate Excellent prices. Casilla 2001, Correo Contral. Bushos Aires

free. Towered 1716 South Ashand Chicago

STREATIONAL U.S. Conjederate States entangue free. Stone. 45-8 Bremne.d. South S. Mane

GOY A Nucles' (Worth lite) the with approvals, 1996 Different Germany \$4.95 Royal Stamp Company Tamaque 3, Pa.

PREE 256 stamp hings and 26 different Canada with approvals Jaydee 216 West Dickstoon Utand Rapids 1 Michigan

ARABS riding camers becomed braules with approvate Me. Mars. Box 304. Racing. Wisconsin.

BEGINNERS! 1-2e approvals in books Povilanskas 212 E 3 St., New York 2, N Y

PAY Less Get Mare Packets by counity of subject. Marimoth dist free Introductory special 100 d. Teres : Air Made free u arry 1 10 only 60c Econopackets Bot. 168 Riverside 22 Calif.

BEAUTIFUL Be gian Saint Martin Set Catalog, Value \$1.24, 25c approvals, Moore \$5-57 130th Street Richmond Hill 15 R Y

5000 UNSORTED Worldwide many rate at se 5000 U S 52 00 Kuhn St-15 Broadway Elmhurst 73 New York

NETHERI ANDS 50 different free to approval applicants. Collier, Box 4243, At-

BAHAWALPUR Silver Jubiles mint set free to applicants of U.S. or British Colonial approvals, Alan A. Taylor, Skyland No b Caronna

BOME INING new activities of fragers of the late terribe Try our bracks of a too different and see for vourself M at hy is and he but floure entering number and price states the first back page 4 a county Modern States Co. Dept. B-4.

### ANTIQUES RELIGION & INDIAN GOODS

6 ANCIENT Indian Arrowheads \$2.00 Oranged Tamphank \$1.00 List \$1.0

ANTIQUE Forest me pieton percussion for to 3 list the rote Wester of 116 Royal Street, New Orleans 16 Louisiana Antique of Parfet Northwest, Perfect Arrowhead and list 56c M. Penning, Klamath, Casifornia

## MINERALA & PRECIOUS STONES

ATOMIC Trinities Hend 25c for actual rad-sective atomic blast operation and information on prospering for triggrees what am mercu with a traviolet Min to a tor Dept. Pad. Ultra bless Productaing South Pasadeus Latternia.

OFMS mirerals the thormation of culting building endough Seed postal Optionals Pamale & California

ORMSIONES Milleral specimens. Every variety Lowest prices. Pusteard brings itee bushest Pummer a 4720 Point Long Ave., San Diego J. Caul.

Diagens Hamiton Bard by Long Land
Damit Startes Hamiton Bard Startes
Lagens Hamiton Bard St. Long Land
Damit Precious and Startes

DEMN Preci o and ample process from nine it is not note sources. Deal Direct no overlicad save thirties Catalog and Hill Cu. 55.0 K Port and Rd. Balem. Ore

COLLECTORS Two Dones being twelve beautiful genution specimena from seminod Brasili Jean Bach, 413 Frais. Icara's Siferal Start!

RECVIAR month y d forest semi preclose actived stone \$5.00 year \$1.00 two months tital members to tiem Of The Month Cub Stat West Third Street H lymod 48 Cautimia

## MORBIEN, COLLECTIONS

WANTED Conserve tobacco cards We to Charles Bray East Barn of Period

INVENTING can be an interesting and probable hooby Write for compute particulars, Institute of American Inventors Dept. 30 E. 631-E M., N. W. Wash-ing on A. D. C.

SEND the for 16 ministure felt pennants All big league baseball tasms Hart & Marine City Michigan

AXGITING Hobby; collect Authentic Mistary Patches Insurans Campuign Ribbons Hory Rutes etc 37 as a ted 41 m Proc mits. Pritt. Dept. 2-6. 12 West 3 ib M Y C

TEATHERCHAFT is fun sopecially will make your awa leather he to include purses hate dresses houses truth durable low proved leathers. Supplement your seasonable waidrobe with leather articles from Cutalog Tandy Leather how 307-D Talos Onjaments.

ANIMAL trophics in ministure free flustrated list Corden Bower Stones the Richmond Virginia

UNUMED matchbook covers 100 different \$1 00 30 page Catalog Sie -Charles Edelman, 1311P East 94, Cleveland 3, Q.

NAZI Soviet Campaign ribbona, big packer Luts \$1.00 Medicalts, 1822 36th 8t SW Caignry I Campda

## PHOTO PINISHING, PHOTOCOPIES, ETC.

TWO Prints each good negative, 3-axp. 35c 12 exp. 30c ,5 exp asc Reprints 4s. Marian Photo Service Son 517 A Toledo. Otho

HMAPS From Frint Or Negative 20 for at 80. Your wight exposure roll developed with these prints each good negative file. Two each the Our each the Reprints for A few cents postage appreciated, L. A. Eastman Studio, Hode lows.

WE Will Copy Your Pavorite Picture Send picture receive new negative plus in 8 studio print by it sured ma? only 17 25 New Photo Studies Box 361 Smarra Delaware

SENSATIONALLY New 16 overnos contact prints or 5 plastic bound superpak arbum jumbo prints with your first roll 35c A-bum Studios. Washercord Ohio.

ENLARGEMENTS! Eight \$120 or five \$100 \$100 West Enlargers, Box 801 Li to Nort Alkanas

BOLL developed and the or lavely overside guest relox prints B exposure for 13 ex source for 16 exposure for. Hagner Photo Service, 1318 West Columhia Avenue, Philadelphia 22 Pa

TOP Quality Fast Bervice & Exposure Ross Jambs. Finish Super Pak Album Or sy Lin 16 contacts 60c Proc Madera Compute Place Place Place Place Resident Grand Fotos OPO Box 1606. New York 1. New York

Fit. POLD Photoe" 20 for \$1.00. Ideal for application or student exchange. Send any size photo or negative with muncy Photo-Print Box 200 Entd. Once

PREE Matters, 8 contacts 30c furnished 40c 12 43c Justième 5'c reprinta-40 Justième 3c Wratern Photo PN-43. Hon 206 San Francisco 1 Caul

is MM M Exp Develop & Jumbo Print each \$1 Justat cod Quality—Prec Maller Plant Photo, Box MP Parkeville Sta., Brooklyn N Y

## 33 MOTION PICTURES, BLIDES BOUND EQUIPMENT

OUARANTEED Fresh imm roll maganess id mm roll magazine movie fi.m. C or bars free ca s of Rap-6. 41th Hour Kansas City 3 Missouri

M 25 E Camero From e mm roll \$1 50 16mm 100' 63 00. Preo processing. Better Plims, 742 New Lots. Brooklyn. N Y. 8-16MM Stient-sound fluxs Compatte

8-16MM Bliest-sound Bins Complete contacts I en pain due tomple film 10c+ Garden Fam, 117 West 50th New York 19

PREE Giant catalog of from a lemma films for home movie enthusiasts. Pilms for every occusion Lee Stann Dept PS6 11 Williams Ave. Mt. Vernob, New York

WILD Life Pilms the ting dramatic action in the natural habitat of solutions of forest and points form of James to beautifu cour of H & W Aim 2'x2' point sides. Write for five point Literature, W.id Life Pilms 51513P Strobes Avenue. No No the record Caul

TAPE Recorders Tapes Accessioned Uniquest Visites Occident 436 East 38th Street Hen Y 28 Call F

5 005 NEW Used & latent Blent-South Films, International, 2)26 Straum, Brooklyn 12, New York

RENT 15MM sound films and reel. Large assection free entaing U C. Pilm Service 128 Chestrat & Roselle Fack N J

EXCHANGE 14mm sound films, also for sole. Bedner 5308 So. Talman, Chicago.

ENTINE Life Story Of Christ" from, 16mm Sound & Silent Rent. Purchase.

Remenway Plan 31 W Church St. Botton 48 Mass Siels Projector

and leach U.S. National Parks in molor Free list Ideal Service, 2181 Service, Oktohoma City 14 Okto

EARN up to \$15.00 da ly with your movie projector! Meteods, 10006 Glenner, Cnicago

PROCESSING 100 ft, 18mm B&W Sire for \$1.50 Frampdort, Best \$17-C, Daven-part, lowe.

BARS Says Tradt g converse a national habit since 1910. We to to Same the old House Juder A pastcard wal do hum-ply say: "Bass, I have and I want Kew much will you allow me? he lefastion guaranteed Bats Camera Company Dept. AC 173 W Madagu St. Chicago 1

BITY who spenish transported and excised enterne più le supp en l'invalende sezier producta et bie d'ur unt Pres. Wholesaie Plas American Buyers 429 Ph Linden

BENID \$1.00 for manuscrib 275 page histrated catalog Your don at the silved with first order Bloom's Photo Supply 1657 Main. Springfield Mass

Pres Dealers Bu inici D tress 15 Camera Exchange It D Waterly Place New York 5 M Y

MEW Brummer Morte Camera, \$30.75 Arris C 3 \$4) 73 other terribe as tige Per talang Comera Shoppe, But 891 8 Mount by on New York

MODEL Hobby and Phote Supplies Louist prices prepaid Catalog The He-fundahor Pres gt t with each July series A but y Wes erie Bin 5th Latania Way

WHOLERALE Photographic Supplies Compres F. ma Projectors Elia sers Write for Free Catalog, Capital Photo Su, p. se. 2470 Dunds in Auto Trace

### MUSIC, INSTRUMENTS & SONG WRITERS

WANTED! Poems for musical settings. Write Sougwriters Service, Cititon, M. J.

PORMS Wanted to be set to music Free pugnis a son Braid parents Mater Man-ter at Masse 310 PH S Alexandria Los Augusta Ca felban

PORMS Wanted for musical setting Servi protes I : tree examination F re The officers Administration

POEMS Wanted for musical setting Muste Co. 1472 Broadway New York City 36. BONOPOEMS Wanted, Mail to Tin Pan Alley Inc., 1600 Breadway New York 18. N. Y

printi While shift Protect your morns and songs Dor't mail structure. We co for pale procedure. For a Berrice 223 W both Dopt P.A. Hew York 40 H Y

Fig. 1 per of your words with my tune From in principal July by Muca Slep t It 1806 West 29 Street Los Angres 22

MONE, WRITENS! Soud parties her ga Munic Service, 2-3 West 120d St., PS, New Cork 33

SONGBOOKS of hibbilly recording artiota of the twenties and thirties bought Royal Carney, \$17 San Matte Dr. San Matter Cald

YOUR Words -Our Music! Song Promo-tion Guild, 350P Broadway New York 13.

MUSIC composed for cyrics, Music gr-

Manifes Wisconsins

Proceed Wanted for musical setting

Cond years for manetale country mans
and Free Chymical Dic somery Michael

Brothers of Words Bu dig Chicago I

POPULAR Songs. How to write and sell them With for free headist fluggers in Songwriting, Chateway Songt. Box 34 6 Hollywood 26 California.

Who easie Free 1053 ACCCIDED/UNITE ata-ig American Assurdion conter \$320 Beimont Chicago

# RADIO, TELEVISION, RUPPLIES & EQUIPMENT

MARK simple tubeless battery.esa dia cance gristing created radius. Crystal and Allen 427-8, Clinton, Mo postpaul

ELECTRONIC Eur II so Obeys spoten countries of February 1 and Obrys species, or of Not a try Park Mail \$100 to Dopt S-1 National land Dept 6-1 Hattorial Industries line 951 No LaClemens Les Angeles Ca forma

AMAZING newly detemped permanent ty fixed crystal de er, r with marrant guarantee and home ere plant for he d WASTABLE. stystal tadam or 7 21 00 p-atpaid. Allen, 437-PS.s Clinton, Missouri

PORTABLE Crystal Radio No calade Aerial. No Ground. Send \$1.00 for Ger manium Diode and Drawings, 2011 Cottes Washington 18, DC

25 MIDOET toudspeaker radios, \* Build-it Book\* \$1. Crew, 412 No. Budgeland Oak Park Historia

REPAIR your own radios, complete, sim-plified, instructions only \$1.00 Details free State's Radio Service. Corneans. Texas

CRYSTAL Operator Louds, south E. in-trated Instructions the Muset St. Lanewood New Jersey

132 KV SIDN whiteener National brands Here eyems so un to 30 - Bex (8) Octob Park. California

BUILD 5 Television Sets and Test Equipment—only \$49.95 camplete Course includes survicing and troubleshooting Al. ports instructions, etc included Supply amited Send for Television "Edu-Rit" today, or write for further information Progressive Exectronics Co., 497 Union Ave (less PAT) ha en 1. H Y MARE Louder crystal radio Fiana.

mounted crystal, carwhicker, 35c. Comacoma Wash

EXPENSENTER'S plans, diagrams, he kirts Al kinds Dittofus 5366-B Ottariest Lie America 43

PRES Rudio Texter Tools, Suffering from Build and keep 15 guaranteed high status and text for owner on y \$ 1.95 complete. No experience required M core back guarantee Cirder di set ce send for desert pi se citerature Pree rai public Radio and IV Report Outde on re-quest. Progress et Riccircate 601 Union div. Dept. Ph. 6. Produce, 11. H. Y.

USED To vote on Receivers \$10 up. Price linta descrip sona lite Ace Television.

BUILDER 8 Construction Plans Lut. Alena. Box 24, Astoria & New York.

RATE C) Tubon ourselve radio equipment thermales Ask for that Kap Linearings to a 25 Mc an New York

MAKE money repairing radios, tele-Pission of Grisnes managements Course parts tools 570 00 Lt granure from Ries-truntes Colchester Cons

CHYSTAL Radio Sensor Plana and crystal 25c Hener 2306 Iroques, Long Beach & California.

AMAZING Television Acteurs, Elizabet Braull device attached to rear of set where i i ous of party Out performs on their periods of party he grand he ghout being or 9 \$2 \$6 or write for free deta a Arr who et Co Dept 33 2300 So Howell Ave Mi outher ? War

PCC Commercial Operator Unerson Quickly through the correspondence course. Oranthum Radio School. 8044 is Marry wood & 4d formia.

MkW' Just out Simplest capacity apriated reay yet. Uses one tube ore preser Comparts deherm to thetrar home \$1.00 Pres Deta a Chem Tern, a Lahn bessed Buse N. Ta o S. New York

## 37 DUSINGUA OPPORTUNITURE

GOOD Paying Business Bilvertra mirrors, plating autoparts reflectors bieve es bathroom fixtures etc by into mersuals No tanks of shop required outfit lur-atched, Free Booklet, Guumetal Co. Ate E. Decatur, Illimate

ELEC RIL trusters accordions, sent il vendors, Amazing profits details Free Sil-flers Wits swale Free talaing Carvin Fer King Suite 221 \$22 Diversey Chicago 14

OFERATE profitable has I order historia. Write Watter Berviel 4349-8 Kast 212th Circleand 5 Ohio

MAKE money addressing envelopes. Our instructions reveal how Oren 5713 Euclid, Gleveland 3. Ohio. Oren Cheuway

IMPORT-Export! Opportunity, profitable weeks a le may order Date | Const may order shroud Established World Trader at pa structions for no mak examination. Fr pe armee unnecessary free detain Mei hoger 16 Ion Ange ee 21

NEWEST Spare Paul Time Business &c. to \$10 hour possible Pault with Burds "rish with touch and everagoral Brestiff auto dasbbrarda sig & tudy or plete Step Or h ep Instructions sert fer unt fin ber fin grammation ? er fie ben C at-1866 Mit So Los Angeles St. Lan Argries 15. geles 3.

835 WEEKLY Working two hours dolly to convenie to No manufacturing Lyche. See 36". B. Cleveland 13 Ohio

PROPERTURE Increase surlings op-erating or saturns, bookkteping orrace C.P.4 system. Hern, 4943-H Vineland, North Hollywood, Onlif

MAKE Money At Home as renewal beadquarters for all magazines. Liberal commission to experience an capital needed Supplies Firstished Wile for Free Calains McGregor Magazine Agency Deat 3108 Mount Monta Liamota

START Venezian Bond Laundry Prof-Stable Air me business New Mach no Per Bones et P.D. Co. 442 H. Seness Warbien 12 Karana

ENVELOPES addressed accurately teasonably Fast Service. We have capable addressers in your city Glenway Syriem.

VENDING Machines-No seiling Opera e a route of costs machines and sarn amazing profits 13 page Catalog Free! Parkway Machine Computation Dept 13 715 Easor St. Builimore 2 Marsiand

MAKE Money spars or full time easters Me a) I up and Nove see Big whatershe dern Ashtropp Ba to ste press manu-in tuerra hosp Production models fur-tioned for up to 100 and more castings bes four No experies or special place personny. Write for incormation and if Priducts Co Liept E 1000 Boston Bond.

Details Kits to 230 A Junio Bt N Y 13

TROPICAL Fish Supplies Bave! Rep-Posentative your area will maps y Namous. Hox 6625 Los Angeles 96 Ca formia

START A Buy he Service bur whole to e the canada mationally advertised and-Many big profits on ling at appeable discours Profeste beres detals American Burers #25 # Lunden Buffein R Y

PROE Binister cores o unias a secreta behald to sew profitable interprised! structions for Starting Wholesale Buying service Deumant Business Surveys, 18-T Deumant, Kenmore 23 N T

RECART aid batteries into new Latest achievements Battery Laboratories Min-

Living minimizer ( Ming ) frees only to to be inches that the was North Pige Profits Spare time opportunity Fascingt-ing: Amazing: Write or Free Reed and Fig. Nature. Europry Dept CC Ingle-Bered 4 Cur irrin

WE love our mat man-be leaves ever elect matter my college professor husband drafted a scientific home mal ider method Works stir-where. We bought a Texas Ranch, live as we always wanted to, Anjone intelligent can apply our method. Literature free. Eveningshade Ranch Hemise 2, Texas.

HREED Have Tropical Pinh at home farts Big Money Learn Secretal Help 7.5 to se demand Amar & O) instant a Preservant Pres Last Alide en 15

POR Pressure And Profit Bend for free Hastrared Instruct on both and business the bow to Perma, in Melacies Co-ramine. Porceianza baby shoes, mittens buctles cloth, lace, etc. No equipment—be felle on belief Professions Art. Products Dept. Page 613 South Welman. CAR E I NO. I

HReg LANCE Probleme Home Bustiese Make fast se ser che se monkey tiret de a fi vers Ter fie h tiday dema d information free Verva Bohemia i 7 N Y

ADDRESS and mail postals Make over \$50 week. Bend \$1 for instructions, Lundo Watertown Mass

"MAKE Products"—sell Mallorder—For-mula Cutalogue Free— Imisco " 4347 Pas-nell PS-6. Chicago 21 Illinois

ADVERTISING book marker Cach in sh his dec at 4 or 1 C tion I abe my ches tota for me bus revers and procedure pur ties Prese pure proventional art ng hat and porter to a runt as a Repetion Match Co Dept PX 451 Sattereenmend Chicago

LFARM meta suite buby shore gifts ric Bronze, gold silver Polio Free, Kik-lay! 7217-PE South Broodway, Los An-

PEARL Pinishing New amaring home !
for time business Free success plant
Pear to Box 71.36 Los Angeles 1

EARN Money With Typewriter Sewing Machine' Deta is Pree Edwards, 30th PS. 12th. Des Moines 13, Iowa

HOW to Raise the Money You Need Free Detail Enterprise Bureau Syracuse 2 S New York

Typists and long-hand addressers needed by hational mail order concern. Work evenings at home. International Enterprises Stillwater 25 Minnesuta.

MAKE \$3 00 Hour At Home-1 do-making sandals George Youtins, 1206 South 1 754 A cadin, Casifornia.

HOW and where to obtain Capital? Free

SPECIALIZED Magazines covering your field of interest help You to glear rancess. Oel latest copies through our Easy to Ger Acquainted Service Hundreds of husbest trade professional educations sport hobby plumbing poetry pourly professions real estate related atom selected and others covering A. The east Send for Lat tiday its fire Commercial Engraving Publishing Company 348 North Ritter Indianapolis 19 Indiana

SCAFFOLDS made with Amidon Fittings and pipe. Amidon Engineering Co E orta 4 Ol to

BUY Wholesaid! Thousands of articles Sair done a Su ree 25c Wrie Joyce P C. Box 463 Jeffersonville Indiana.

MAKE Rubber Stamps, repair doles learn invisible reweaving Mosding Latex. New Low Prices, Catalogue of 40 Ideas."

LARN Extra Money weeks manning of all on a top advertisers. Complete in afractions—25c Signation 611. B Oleans Street, Embated 73. New York

BUY Wholesale—Thousands nations y advertised items, Buye—Make Mores to the de will, Duren Co., Box 573-W Concurs I angle,

WE have 200 Motels, Motor, and Tra er Courts for said throughout nation, Descriptive catalogue Parkway Realty, Stiver City New Mexico.

MONEY Bu lette magazine shows how to make money to bome must business. Sample 10c Costar G.P.O. Box 972 New York 1

START Extrag New Mar. O der Bustness No live i ry or ad etforts Costa t teoriera is Manuscript ree with Instructions Adelbert Torrey Hower Mass

BENBATIONAL Musti-color Screen changes panh black and white television pictures into beautiful, exciting lifelike corn Wate Natura For to was Screen Co. Box 708-A. Brownsville Texas.

WANTED! Home Producers By Manufacturers in our Clearing House hervice Become a sub-rentractor case of plant of plant of plant of the sub-rentractor case of plant of plant of the sub-rentractor case of plant of plants of the sub-rentractor of

45 HOUR! Start Invinible Re-weaving at home. Pree particulars. Law. 54-R. East 99th New York 29

SELL books by mail! Wholesale catalog

RLY Whitesar Too obd I can Details Free (of age , dus rice Oma a 12 Neb Liquid Rubber make flexible moids Free Sample, Chancy, 1110 E. 18th St., Jacksonville S. Fla

LIQUID Marble Conorfo quant M ded broaded sprayed Can Nove es Bta days C red I es Flexible Mu da C map a tion Floury Par ich any thee Marble & Service Edwardsvalle Illinois

FREE Electropisting Information, Money Making Plans, (Formula Included) Send Posteard for your copy Huday Paid softerer of Uncrowded Freid Plater D Hyde 127 West 120th Street, Los Angeles & Camerin a

MAKE Pertumes At Home Write Carry Laboratories 1944 Chonteau PS-6 St Louis J Missouri

RAISE Earthworms, Easy, Profitable, Free Literature, Earthworm Gardens, 224 W Valley El Monte, Calif.

TO \$13 00 Weekly Space Time Home Operated Manager Busiless Success un-Beginner's Plac Everything supplied ! Lynn 18429-C National Los Angeles 34 Cal.

MINIATURE Trees. Why pay \$5.00 for growing secrets? Free details. Tiny Trees. 5035 N Winthrop Chicago 40.

NATURAL Moiding Latex Extra thick New Low Prices. Free sample. W Wooley ,15B Donald Peoria lilinois.

OPERATE Profitable memorder business Particulars free George Lenhoff Lincoln I Nebraska

HAIR Growth Discovery' Literature 61 00 Pasyk Co. -PSS. Station D69. Toledo \$ Ohio

"MAKE Perfume" Catalogue Pree -"International 6347 Pathers PS-6 Chicago

LEARN Sewing Machine Repair electric rest trade set. Make up to \$150 week apare time settly. Motor kits ing as materials etc. who erails Free Pa toubis Taylor Service Hamilton PS-8. Ohio

PROFITABLE Bome business eccuropet a marches grammes autoparts more hast respensive home procases free book et Tyen Metass Box 13231-CM Rouston 18 Jeans

MONEY in new greatelest doughnuts. Start in kitchen. No smoke Sell stores bice recipes S. Ray Co., 2005 South 15 Ave. Minncapolis 7 Minn.

\$50 00 AN hour in spare time. Johnson. 351-D Ithaca New York

LARN 415 000-330 000 annually Pranchite projected Couranteed maintain 3.1 00 or 0, sey back have at home No. incommon to buy Severage ed Orco. In 121 ex flashe and no collected to bush extends to have distance and have a bed not for expanding to book Mr. e retuided when book rearried Harres & Collect year Book A.2. Louise & set va

INFORMATION Researching Pana 44 00 Hourly Investigate, Cutler Publications Reading, Penna

MAKE Secrible molds Cast plaques books, da figures to tree sample H I wast 830 A then not Hank on Ohio

START ) at on , or Stance home man order has eas We supply everything We de day Studio Products Bux 306 D G et date 5. California

NEW Excestions y profitable , a a ideas for home operated his buy as R in your Hoad has Ceraid 1, Otto

MAKE so 'J Every lime him so one and to be awareney rass to be. We have new Add a Machines in you fact by cartises you can see for y bis so and you make to I es in executive mode, partiables precision but which are made course defects habit activities to a manual manual Metale today to I are a Adding Machine Co. Inc. Dept. Provide a Adding Machine Co. Inc. Dept. Co. 17514

1200 WEEK Pusable! Sensational new hand element Manufacture, distribute East Pire plant Krenelo, 1443-D Lander Denver 2, Colorado

MILLIONS Need New Merchand se Itemasell By Mall Red Hot New-Different Everything luminosed Taylor G P O Hox 314B. Bruoklyn I. New York

Skill to opportunity seekers, instructional self help book. Free information Hade's blocket Kataas City Moscott

SELL Religious Rems By Mail Middless of passects Be Probas Everything Purnessed Users are Free Kelley Box [5] H Sar Francisco Cambridge

1200 WEEK reported? Free book "505 Odd Successful Businesses." Work home Expect son ething Odd! Pacific-J6C Ocea side Caraottis.

HAVE Home Man Business Big Earlithes Everything lurin sued State low as \$150 NMD Agency Box 68. Doronester 22 B Massachusetts

50 PLANS For Home Mail Business Proven Money-Makers, Personal help assures success Verdo, R. I. Box 37-B Huntsville Missouri

PIX typewriters. Free booklet describes our modern, inexpensive home-study course, Pactory methods taught Write Typewriter, Building 4, Tarentum, Penna

GET Latest—Best Home Mail Business Offers Low-Cost Co-operative Book-Merchandise setups. Write; Sherron, Hox 143-A Bloomfield N. J.

BlG Profit Home Business Opportunity Man, I terature featuring fast-scaling Photographic items. Everything furnished, Glossner 712-A Chestnut, Xenta, Ohio

GET Dollars in Your Mall-Keep Every Cent, Orders Filled Free, Genmerco, Box 142 Boston, 24A Mass

HAVE By Time Mail Business Oct ideas help insplation from others who made for ones Fern 513 B West 61sk

Shi L Automobile Owners By Mahineeded Items Everything for sahed Bur ear ogs Eastern Box 143-B Boston 26 Muss

HOME Business Opportunity—Mailing lite a are -to inte ads offert a fair select repeat order merchandise. Everything torus ed Bonas Box 134 B R sheard O

START home mailorder business Detable fredgard Box 784 N New York L New York

MAIL Order Bus, ess using profitable Pree Advertising Method reach on 56 a m into live H O Se de 70°0 Hodywood Bavd. Hollywood 24 Cast artis.

BLY 250 000 art cles who coale Direc-

Bit h moments I ve d Tetens casalogs of arge New Jetsey Who essier with Dealer Price lines on Pannus Brands of aniches appear on typewriters carrenations etc. \$1.00 \$2.00 retund cert ficates area O are terd service who essee or a money back Distributors Box 1543 Paferica N J

WANT a new car fine coothea wire mores. These can be yours Compete home place for making setting many countries are arrived to the post of the cootheast a state of the second state. At and Arc. us River First 1, non-

OPERATE "Escalator" Manarder system saling our products of any products, Fastest most revolutionary mailorder system known. Write Selbyon. Decatur 100 111

MAKE M ney multing cards: directars.
Pleasa Profitable, Paten, Box 55-A New
York 11 N Y

FRANCH NER make profits Become exclusive distributor of agency operator has awide as actionalles her aminediate action write National Pranchise Reports 452-A Pure Oil Building Chicago I. Ili-

AMAZING! Two business Selds growing themend as a Startling Success Plan Free Tree ds A 6 16 s 5550 Crossic with Starton Memphis, Tennessee

Exciting home business proposition. Sample tree Renzi Press 2t H North Beveral Newark ? New Jersey

SAWDUST, Turn It into cash, Twenty methods Instructions 80c. Charles Company 17 2-42 Norward Olio

PRINT Will but Printing Press Posters, ballers gives givered toys grassware, necks to any lawy, New easy Revolutionary Method No special equipment or experience heeded Work full or spare time a time No seiling We set up your own out to be to business." Wonderful \$8350 upporture to programme to be sample Profitable ideas beautifully assisted plan free Wille Screen. To the 10.0 South Los Angeles Street. Los Aparies 14

PUPCORN and Potato Chip equipment Long Fac a Company 5363 Hagis Springheld 98 Ohio

SHARPEN any lawn mower without cost Illustrated instructions \$1 00. George Steele 269 S. 4th E. Provo, Diah

'INCOME" from local information, No Seiling Write Nebergo, LaVerne 6, Calif.

EARN money in your spare time, make and sell thinestone jawelry. Easy to make and sell 100°, profit Free catalog Feerts. Box 123 E Orange New Jersey

FLORIDA Opportunities' Hundreds of jobs bus cases arms groves ranches. hones free de sia Flurida Opportunity Builetin. Box 456-N10. Coconut Grove, Mistra 33

FREE Vending Machines; if used to sell our profitable nuts. Continental. Box. 1361-B. Miswaukee i Wisconsin.

\$15.00 THOUSAND, highest prices ad-dressing envelopes at home-longhand types ter A mon Torrey Rowsey Mass

I DIMINSIONAL peaces contracted maetime Du, scaler Profits to 63 hour engraving plas to Sample 25c Dearn Distributors 6234-U Sepalveda Van Nuit. Callf

START B a ness without Capital Re-

t YCOPODIUM t fivates distant on what But shrives. An econs. Fasc nation diving and Christman wires b course. Execute 25c for sample cortage Lycopodium Poundstion. St Faul 13. Minn

BOY Wholesale From Manufacturers Thousands articles, 1953 Directory \$2.00 or COD \$2.40 Artic Barnes, Gen. Delivery Kathas City Mo.

158.005.000 CUSTOMERS' Repeat mailorder Item. No investment. Sample (worth 83 80; a d com, sete plans \$2.00 Relund-chie RAH Products 1642 M Detroit St., Los Ange es 66 Ca t

MELL by Mail, My 46 page booklet teds how to begin What to sell. Bend 500 to Miss Grans Mt. 4500 Poster Ave. Brook-by 1 M Y

(XII OFFIT AZEL) C microte purley made without molds Patented me bod Centra-tery products more on the Papersont real sea of Money-making projects Book-let data a free Men or y Natural Put-teries Carana Hayde Million to

BUY it wholesale Mails acturers Dis-tributors Over 650 000 Herrs Litera u 6 (rec Oven 123) B East Third Bt Dututh 6 Monroots

H'ART Your Own thrilling mad order but less, on small capital Brand new plan. Write Paragon, Box PS-2184 Houston, Tex.

SELL printing by mailt We fill orders. Proo plans samples Sutten Printing, Box 851-H Wayeross Georgia

BRONAED Buby Shee Metallizing coupment. New and used Big selection of metal and enyx mountings Proc catalogue. Rolly-wood Bronce Supply Dept. PA 1834 E. Pirst Street. Lee Angeles 13. Calif

346 FROM Squaze Foot Plywood, Jig-OR W. BOCCHHALY Waler Muhh

BIO Money! Start your own Plastic Business at home Spare of [u]t \$12.0 (A200 Valuable Laguel Marble Interme-tion ) Pres Catalog-We to Bong Products. PH 653 Watertrum 17 Mans

21G Money Fast-Bell revolutionary new improved regulator Car ewners buy sight. Send \$5.00 investment yet starting parkage law Telester Distribulorably avaluable Brientiffe Tiectrie Ca. Box 2142 PC Lieveland 8 Ohn

## MONEYMAKING OPPORTUNITIES

DETECTIVES Earn Big Money Experi-ence und researy Detective Particulars free, Wagoner P-125 West 36th, N. T 26

\$16 cos PicOFITH Y our own Main reef Business! No Capital Risk! "Success Plan" (worth 43) Free! Write today! Transcry 100 Webster Ave. New Rochelle PS-12 N T

SELE Pitanas gema 60 /5 curut who in-note More for fant than Diamonds Pres-extensions Diamonds 1606 & Matchell Out and 1 Car (

BPARETIME Profits Taking Subscrip-tions, Ad Magazores Witcoresis Catalog Prof. Cassel error Westfield 1 N J

START A Busing Service bus wholesale in meands nations y advertised or de-Cincounts Postenze britigs details Ameri-

PREE Bookiet reveals amazing secrets behind 301 new profitable enterprises Many mallordert Includes confidential inatructions for starting wholesale buying service, Deumant Business Surveys, 83-T Deumant Kenmore 21 N T

MAKK Money addressing Envelopes!
Our information reveals how Only Juc. Business Dept. 46-7 P. D. Box 2234 St. Louis Ma

78e BABY necessity. Agents or Mail refer Big repeater Liebig Industries Order Big repeater Lie Beaver Dem & Wisconsin

BE Notary Public Rate Higher Details free. Stationers. Helotes. Texas.

"THANK You Call Agein" and 1998 other Ultra-Blue T'zll" Bigms-comedy general religious et all 50c sechi 15 samples \$1 00 Lowy \$12 Broadway Dept 12d New York 1

SELL by mail Chamberlain Books. IT Artmone Place. Chandler Arizona

84 06 VALUE Read Hood" Use fishing. hum and P as Shares to Pating . P. Send \$1 00 Bi-shop 2'29-W Liabon, Mu-Tautee S. Wisconsin

OPERATE A Profitable Business from Four Jones No House to ca v Orders S ed for you Big Profits Pier Details Ret aw Com tany PO Box 20M May-Boad Ch fut to

GON DYN Opportunity? 500 Broadcastthe Sta one Mationwide! Commission Bast You say only I r orders received No II said A so other information to a to writing these stations \$1.60 post, said. Denneits Products PO Box 165-A Providence 1 Rouge Incapil

WEEKLY extra income mailing circulars for advertisers Complete Instructions 25c Enterprise 21-A Banford Boston 26 Mass

SIDELINE Balesmen-Auctioneers-Ageo s- Free wholesale list-watches \$7.48 Jewelly nets nete \$4 20 g so name bratifs merel ardise everyth ng guaran red Cases H. save Corp. Dept. 16 418 Jackbon Chicago &

GROW Min alore dwaited trees. Instructhough fifty Metro Box 1822 forture le-

PRET Your awn madorder business' Eve t him jurnamed No more ment? Terribe profits! Write today California Vi amina 2010PS Beverly Boulevard, Los Angres 4 Cullian a

OPERATE Profitable mailorder bust-

EARN Money Evenings, copying and duplicating comic partisons for advertisers. Adservice Argyle 2. Wisconsin

HIGHLY Profitable Home Work -Doing Addressing Mailing Darsell, Boz 506, Jackson Tenn.

PI FURE Security Learn Wa ch Chief. Repairing of home Free information Mide to Technical Supply 56 PS-42nd Berret Ren Turk 36

PROFITABLE othermeetal castury business at home Pres is officialism Mert e p Plasterera t. Ban Bernarding Ca il ente

MAKE six pair corrings in two minutes at for \$1.00 complete hit contains every-

MANUPACTURE Stingstone and Pearl Jean ex at home Latest creature tre-mer done prints no sat needed P steard tiones, ele A. V Cu l Cu let 2 Pilth Are | Ken York 18 New York

brattiff bit fint a unter ted. Un nereiment Reimer 161-e Weirfleid Braubor 21 New York

PREE Book 503 Odd Successful Book comes Work Home Ex sect a method Odd Pacific 350' Oceanside Call

WHOLESALPR of sprantional pationally adiest and all sames a service matches fumeras etc Start pour una burtaces Pull deta s fierd 25c for esta scar Inter-national Scare C Dept B 175 21fth Are New York in N Y

WF Pay Cash For Box ope Labete tappers Con with Pert culars free Bestigs PS SSI F Mais Countries 5 O

OPERATE Profitable Tipert In sort princes at home Man, \$1 Statisting Great Heek 5 N Y

BUY Wholesale Matsutally advert and appulances housewares were sy watches ele Pres information concerning fremendoug discounts Econ O-Mart Box 535 M ertifant New Jerney

PLOATING Repryburger" Systems | Pranchise, Rare Opportunity Small In-restment Box \$36PS Wichita, Kansas.

\$300 WEEK possible Complete plans 50c ( Horval Roland Langhorne R D z 4, Pa.

DO you want money a bome your own ; business? Information free L. Minkoff Box 32 Plushing New York.

WIN contest money General Contest Bulletin gives hundreds of tipe, Lists cur-rent contests and rules. Sample 25c, Gen-eral Contests, 1600 A East 5th, Dulath. Michigan .

MAKE Mig Mency Spore Time mailing post cards that get cash sales for your Start small graw hig' \$3,000 yearly earnings possible! Free details, Bayard's, Box San Francisco 1. California

NEW Ideas and Items Die Brings Sam-ples to etail for \$1.00 Specialists Sen 4 th Park Hidge I noss

115 IN Personalized Bany Repord Books Sell By Mail Use Same Literature We Do

STOP Money Worries Own Profitable business marting advertising literature Write Specialty Products. Box 164, P61 Mt Bolly Springs Penns

START your own business on shoe-string, and earn a substantial income by mail in your spare time at home Pull details from Standout Products 161-B North La Bres. Los Angeles 26. Calif

\$35 WEEKLY addressing envelopes Instructions 11 re a duble Adservice Apring Valley 16. New York

## PORMI LAS, PLANS, ETC.

FORMULAS-All kinds Latest products Laterature free Memico Park Ridge 15 Il.

FREE Pormula Catalog. Anything shalyset \$15 00 Western Chemical, Sason, Ore-

AMAZING Book? 10 000 Permains, 300 pages \$1.50 pages Outlanted Pagette 2000 Pagette Pagette 2000 Pagette Pagette 2000 Page

MILLER S modern manufacturing forfrom an make fast se ling products 'f at get the business and pay Fifty years supplying the best Literature free! Liscomb Miller Chen at Tampa Florida

ANY Portugue \$3.00 Chee, cal Instruction Short-catalog 10s. J Bellort, 216 W. Jackson, Chicago 4

## PLASTICE

LUCITE, Pluniglas. aine sheets Any marked Square foot (12 k 12) port 1/10" 61 20, 16" 31 40" 3/16" 31 75, 14" \$2.00. Incaude 18% postage, Alman Plantics, 806 Broadway 16. Y C

PLASTICE home trait course for Men and Women. Tests and shows how to make tundreds of fast selling plastics products All plastics and materials for 33 projects architect in course. No special tools treded Course pass for itself. Write for Free back et Interstate Training hervice Dept D3 F Portland 13 Oregon.

Liquid plastics, clear 58c th, Lucite 64c, others 14c, 68c, hardners, promoters alquid subber Where to buy one gal up Wholesale Directory \$3.00. Castle's Co-Rox 2129 Paterson New Jersey

FLASTICS -- Cements-- Dyes-- Findings--Carvings Wholesale prices, 64 page enta-log free Trace & Carve" pat ern book for carring and culoring fish be do ar semals, or y abo Tax or a Art list 1790 Kars 12th Bt Onkeand 6 California

PLASTIC Sheets, Rods, Tubes, etc. Free b id Br Louis 7 Mo

LAMINATED PLANTES, special parts projects, dull lign etc. Pros Estimate darry Smith Specialties. Box 5378, Akron.

NEW I uid easting placese Clear rese ore Exched flow on inserte con a Saw drel curve Soud 23c for Caste its Corations Mad at and proved Success Plan to the ng hour to make morey at home Car of the Dept O 22 Wedstock De-

PLASTICS Lose Pietigias Acetate Viriote Poises or Pibrig as Tare jaw prices Value cacked by gain 8 ed cat-arog the Altmailed 23c Gens O Log Box 60638 Nursin His promit Cost office

BEAUTIPUL Internal Carring with Leastress \$1.00 Pantigary 6801 Orders Defroit Mortigan

## 41 CREMICALS & APPARATUR

LUMINOUS Paints will glow in dark Six colors, Fairmount Chemical Co. 136 Liberta St. New York Cay 4

NEW Idea Chemical and Apparatus Out-Sta for Home Experimenting Photo-Scales Mic userpes Cheft can But sicul and Laboratory Supplies in Small Quantities Catalog 25c Established 1912 John H. William 17c B West J &S cert New York N Y

AWAZING New Book of Science Experimen a Formacar and entallique of Lebita-tory Supplier Only 216 National Service rine Co. Dept. 15 2206 W. North Ave., Chicago 47 Illinois.

EFECTIONCOPE for quick abunical analysis \$7.00. Book 200 electric stants \$1.00 Cuiting Sons. Los Altos, Calif

ILL USTRATED Catalog Chemistry mineratory hiology 18c. Tracey Laboratories. Evanston. Himota

CHEMICALS and apportune for industrial, analytical, and private aburatives. Catalog 25c Dept M-26 Biological Fig. 17 Co. 1176 Mt. Hope Ave. Rochester 20 N Y

EXPERIMENT Manuals, Chemistry Physics, Electricity Free List Experier 1 Box 25 Long Island City 2. N Y

## 41 MELP WANTED

FOREIGN & Latin American Employment 1953 "Foreign Bervice Directory" rives Up-To-Minute Facts on Military & Civilian Construction Government John Maior Oil Listings Available Transportation Steamship Lines, Mining Importers, Exporters How-When-When to apply the Maior to me Hillage Furnity Mills on the And Chabs Reports. Mes 201 R. He 1944 M. Cale.

UNICERNAL Come action News' New monthly publication describes construction job opportunities, U.S. and everseas, \$1 per copy Universal, UPS-1 Box 30 Biblion Montage.

At ASKA 'Last american Printer \$1.00 brings 1853 Business Directory & Government Map Military & Civilian Construction, Homestead & Highway Incis; Mining. Aviation, Fur Farming Grasing Timber Fravel directions, List of firms hiring flow to apply Alaska Opportunist, Box 52-8. Rollywood 26 Calif

ADDRESS and mail postals. Make over \$50 week Send \$1 for instructions, Lunds. Watertown Mass

JOBS on these Excellent bas Foreten travelles Free details. Davenport's, Box 1344 OPO New York t. N. Y.

Bt one con FORFIGN & Dorsestin Conettuct a Projects published No. 1 y given Cuttract r & Lacker M w When Where in apply with application form 41 80 post paid, Olobal Reports Box 343-PX Mostrywood 28 Calif

BAN Diego Heip Wanted newspaper clippings, send \$1.00. Circum CC1, 6786 Lmpr & Ave San Dieg 14 fa ? REVEA, 2D At Last Valuable place

REVEAUD At Last Valuable plain Couran end to and destrable murthan a pube \$1.00 Fm overall \$1 Cristonden it reet NE Warhanavin II D.C.

Billion 60 M INTHLY For Track Drivers \$1600.00 m othy for expensions electricate times to and mechanics \$200.00 for electric as a laborate were \$2000.00 for electric as a laborate were \$2000.00 for tweeter electric and the second of the sec

CHICAGO Help Wanted columns maked. ] 81 86 to Al Rupelio, 5343 S. Patriicld Chicago, Illinois.

OPPORTUNITIES for you Chee newspaper by commo bundreds of the paring john suited to your skill \$1.00 to paruably News 2148-B Borth Bastond \$5 475 cmc.

EXCRILENT Opporture ses \$1.00 hears Men and Wimet Wanted Samen Wanted "Business Opportunities Addron Sunday Editions of Portued Organic Management Bervice, Box 216 Portland It Overent

CALIFORNIA job opportunities are Wide Open Complete current report Jobs Pay Opportunities. Housing Living Costs Maps. Only \$2.08, Pacific Industrial Associates Dent Red Box \$12 \$anta barbara Contribute.

BOOMING South Americal High paying sonstruction opportunities for trades and professional men information on firms with our races living core etc. 61 Johnstone PR 7 Box 20 Billings Montana

CAL FORMIA Men needed now Untim ed upen rus John for everyone Ek ed -u th ed Highert wagen der d 11 20 Ca stern a Joh Opportunities Box 970 J. Les Angeles 53 Ch. et a

EARN extra cash by addressing advertising postals at home, Write Val. Co Box 1943, Muscie Ind.

## EMPLOYMENT SERVICES

OVERSEAS Jobs Big pay transportstion superiors Correct professional macrations at the Most as, trades fatest attogs at the construction manufact of the of atcampbig temporion accretiment sacrete mail other opportant on Up to date florington on securing surer sweet contracts income tax applications forms \$1.00. Overseas John Box 335-Big Baton Bougs In

PORTION Jahn Contracts underway and and Martine in Africa South America Canada & s and Junipe South Paris of Middle Last Meaco and Alaska Send \$1.00 for I retain job news in time thin application forms etc. 1978 Principle on News Dept. 368 NL Hodgepart 13

CONSTRUCTION Jub Lat Put 19746 Marte 7 \$1 00 Demaster a Canali 17 to Sec. 1 News Dept. 268 NE Bridgeport III.

### 43 AGENTS WANTED

NEW Jobs open in selling! Bend name address for five free leader of County by Many on a money making a 160 1 close buildings of comparison who is now you are all or part time he frape into needed Opportunity in a Jackson Dept 18 Charge 4 at 1664

BE A Maney Maker Cor your home as maker to bradquarters Liberal combined at a large to the Societa needed for their we have the for his and the Catalog McGregor Magnitus Agency, Dept 5186, Mount Morra, Illinois,

AGENTS-300's profit acting genuine poid wirden jetters ate et and offices Pres aamples. Metalife firm Letter Co. 421 & North Clark, Chicago

BIG profits selling that 432 00 values) by se dozen P se calade Emplie Cravata 644A B sedway how York 12

WHERE To Buy 800 for articles direct from manufacturers at wholesale prices Send name address for ires outsine Gana Publishing Company El-anod City a Pa

ABSOLL IFLY Free states Kat Y sura for the asking Se d par ford today refor the asking Se d par ford today refor the asking Se d par ford today refor the asking Se d par ford today reforders the ce 3000 different toptenders the ce 3000 different toptenders the Mank-Fast Box 1425PS, Providence R 1

5. WHOLERALS Dealer Kit On Appl. ances Typesiste & Recorders Came as Officer etc Free Wille Asias & trab-

MLY Whiteen e thousands hartons y advert sed products at his discours. Proc. Who ward Proc. American Buyers 270 h Linden Buffelo Sen Yick.

NIANT Year Can Business on credit Tear away have 2506 of our Dealers and to obe to 327 500 in 18a] We say a section of a small or credit 200 home present each an experience unnecessary Present principal to the teaching wind units and only William William Ramseighs Dept F-U-2551 Frequent 11

MUY Wholesale 7 600 Hemo Cataing Me Matthews 1672 AS Broading Age York City 36

ADDRESS and mail pustals. Make over 256 week Send \$1 for instructions. Lunda Watertown. Mass

ANYONE Can Sell Hoover DuPont Nylon Uniforms for hearty shope, waitresses, doctors marses, others in white and colors Executes styles. The quely law yrices Executes styles neome Res future Expend free Write in y Nature Dept. Nat. New York it New York.

CALARDARS Advertising Novelness Marches As strict one oding Responde Valenties of a Rundless of Advertising Countries Book Marches of Productions Distance 6339 Cottage Grove Chicago 27 att

START your even business at home make extra money spare time taking subscriptions to popular magazines. Liberal commissions & valuable prices. For details and supplies Write Dept. Ph. H. me Beading Circle 26 So Center 54 Spring-field Obio.

4 we doors trucks St. dard same Perny and up Big p. to Samples Atlan E c. 544 West 76th Chicago 30

MEXICAN Printer Pictures Sell on Many 200 profit Proc Sciana Banque Ale Manya (No County). Byllias. Approade 18036 Munice City

MAKE Monor Introducting World's rutest children's dresses. Big selection adorable styles, Low priots, Complete display free Rush name Marieté Dept J-7841 Coccurs 1 25 Ohio

APPITANCES So d at flutributors prices June Special Dormeyer Fr. Well Relaid \$28.95 your even \$18.97 Write Wire or Phone Sol Distributors, 313 South St. Fact Liverpose. Ohio

NALESMEN Descributors fast selling costume jewelry direct from factory Big picture catalog free. Pickeraft, C-18 Bank A I short Massachusetts

SEND The fir Wh coale Nivelly Cata-

SALESMEN wake up to \$50 in a day of rg brand new tem going to every type of food and beverage store factories laboratories hospitale etc. Hampies Purrished Cristy Durawear hi host Jackson Rold, Decr. Ph. 6. Chicago 6. Illinois

MEXICAN Frather Fictures, Terribe Profits, Adalphi, Box 57-G. Belleroes 36 New York

CALIFORNIA awart amelling brads sen-

\$ \$ \$ IN easy to take orders for photoparic paper a rea, year round a obey maker Every rall a prospect House to be one accord modeling for add see a line a second this Get full is orbitated think that Berviel 175 West J reson Book Brown A 644 Chicago 6 I driven

RARNINGS unt moted blue on prosperts. Recent No. 1: testinent Steiner 181-8 Westbeid Brook pp 3, New York

CERCLE) you sell trying stockings at the That's all fiver cost of they rule or grad as his guarus tee period. Also men a and children's sicks I, we so harp to El an river against time with a self-er. We do not aid on sect. Advance onth plus high to cash bom in A marriage ears of \$202 to b data. Watt no sect \$22 indees one day Opportunity become manager approximately become manager approximately become manager and sales with postcard for ree name as and montes. But he was a section of the Conden.

POWER Movers 832.20 not Rome Agents Parince No Licensed Springs Mo.

HELE broke paints by mail Muse profits Win reals entained for Match 17 W tarm IC adais from Jersey

SELL Big Motter Maker to Men and Women. Easy handwork makes last sealing worful a tir co Sample item Summado Company Brock on 16 Mass.

PREE book '565 Odd Successful Businesses." Work Homel Expect something Odd' Pacific-180, Oceanside, Culti

BUY Wholemie from Nationally Advertised Manufacturers, Distributors, Literature free Carter Publications Bod 4011-M Chicago 80

MART Exten Money By I front door bate e plates to it wide no chbory Retail \$1 bt plan make \$1 00 Pres as, ing bit Modern Engraving Co., P.O. Box 494 Estim 16 Mass

87G Probin setting that 192 00 values! 66 25 dozen. Ca alog free Loren Specialties 63 1 E Flournoy Chicago 34 IN

HALENMENT No Calle-Sales made by mail. Get in the Big Time quick! Write Maxion 117 Leceburg Pike. Palis Church 16 V gen a

MIP-Tee Laneila Handeleaner waterless removes Paint Grease. Ink. Write Holms Co. 2446 N 18th Street, Milwankes 6. Wiscousts, Salesmen Wanted

## 44 MIGH GRADE BALFSMEN

ADVERTISING book matches—Cash in an hig demand—sell Union label matches. Cats for as his excess and political purters. If we provide a guaranteed on repeat the side at Cast the man in Rupertus Match Co. Dept. P. 653, 1930 Greenwood Chicago.

WANT over \$1 000 00 Monthly? Write today Construction 912 Ps Virginia Grand Rapids 6 Michigan

AD Marches Set, Amarine Designs— 35 M of and bed 1 grt book matches Suggest such cash outer seions every business a primpert Low prices for high quality Retwar Start without expense of sen women for part time Sug Mathine Sa es hit furnished March Corp., Dept. FS-42 Change 52, Hitties.

# POPULAR SCIENCE OPPORTUNITIES

NEW! Balesmen and auto owners expense record back saves during Needed by business and profession Quaranteed Write for details. Dept. P5-101 P O Bus 1013 Bouston 11 Texas

# 8 EDUCATIONAL & INSTRUCTION

Books sold and reled Miney back guarances Catalie 1 per (Coulses Bought) Lee Ministers Propali Audoma

R.GH Sennol No Classes Study at home Spare time D.1 ma awarded Write for Free catalog tillA-28 Way is School, 2627 N Sheffed Catalog 16 11

POR an extremely profitable lifetime bushess operate a Collection Agency Quickly Instruct. Write Cole Associates. Syracuse 3. New York

BOOKKEEPERUT Increase your carnlags Operate var own tames of Dollar-A Week Bookkeeping and Tam Service Pills or space time Deta a Free No obligation. Et is Bux 201 F Cedar Orote North Caronna

BE a Real Estate Broker Study at home or in chaircom in leading cities. Write for Free Book today Weaver School of Rea, Estate 301 Law Bidg Kansas City Mo

PRACTICAL Nursing - Learn Easily at Home. Space Time. Sig Demand, food easilings litigh School not because we for free facts Wagne School Dept FH 16 2525 Shellerd Chicago 14 Lil

inchartifficht Become Mental Super man Overniget Free Book et Bilon Box 1727-V6 Hollywood 28 Cm Jor na

WANT A Diesel Job? New Opportunities to increase autome Haner Pay More Maney We can only you Quality Tools Maney Diese Tractor Heavy Equipment Division Interests Tractor Beauty Service Dept. 82-F. Post and 11 Octob

MEDICAL Laboratory Technicians in great demand We then you in your own home. Cotalogue free Imperial Technical Institute, Box 273-B. Austin. fevas

PIANO Turned Park Learn this profits able of dear is at home Our In. meter and mathematical and mathematical earliest earliest and mathematical earliest earliest and other schools. In pract O. I. Approved. While Its business North Hayant Manual T. Bryant indig. Wasters on 16. D. C.

DECOME a Doctor of Psychology or Metaphysica Learn secret of contentment, has a trea Win degree of PaD or MaD. But to men as work on first beautiful to second Universal Trath Suit K Broadway can are

OWN & Collection Agency Big Money'

BARTENIANO and ma agenta, American Bartending School P-214 S. Wabash Chicago I am a

HEAL Yourself Without Drugs-Live Repolly 100 to 125 Years By Miraculously Rejuvelating your life energy every 25 days Thereby you Get West and Kern West years and years it a Liter's Different and Revolutionary Its methods per larm American Security results with all market of Constitutional Diseases Only 45 30 this month, Popular Carter \$16 Carter Avenue, Cincinnary 3 Cons

LEARN to write interes ind letters by softenpundence Personal or thouse Economical Pres Sets, a Ruster Schools But 303 Rose of Alexandria Mini to Ly

COCUMENTARY Photocopying Life in come Uncrowded Hume study Outh Franchise Free Ace School 200 Broad Engageth 2 N J

FORMER Abstracy Teacher will share fascinating hobby Make from go do in the charte completely transparent fluidy absention heart etc. in your fluidled specifiers. Send \$1.00 for coursed postinational ages men like you can make their \$5.00 for complete chemica bit intended \$5.00 for complete chemica bit intended in three preserved appearants. Detailed instructions from with either order to expensive equipment needed Shapped postpaid. No GOD a please. Listion Corp., Box \$40 Feahody Mass.

WELDING training pays at Hobert Welding School. Box P-431, Troy Ohio. VA Contract Best equipment Catalog Free

POWERFUL, Vocabutary self taught?
78 rpm record 60-page natrue sons \$1.00 complete. R. Oraust, 210 Fifth Avenue, New York 10

FIGH home study course in basic promonies offered as a public service Recadmended by many lenders. Send provide d for complete information. Heaty Goo as School Dent P. 30 & with Street, New York 21 New York.

US Oct 1 John Men Wamen .8 55 start bigh as \$716 00 month Prepare N. w. 4.70 000 john open Experience of the quinterstary that Prec 32-page Civil Service book howing john talaries sample tests Write today. Pranklin Institute. Dept. A-22. Rochester New York

Box 411 Rudson, New York

RELIGIOUS Rome-study courses for minuters and asympto No ob action for the liter Bunction Midwestern Science 517 Merchants Bank Bunding Indianapolis Is diana.

WHAT S Y MIT I G ' Give routeed our 3 h. test Revelo it for eta nation & scoring, Send \$2 to Ecker Testing Service. 1900 Rim Road Palm Springs Calif

LSED Correspondence Courses wanted Big iest prices paid. Details free, Harry J Managan hing record Code New Jersey.

SARM \$2.000 \$5.000 Annually in your space time Secure a Tax Consultant, Securing your result has need fire Hattails calon Institute Lakeward 6 N J

STRUCT' RAL Draitmen in his demaid on one pite available Learn at histor. High wages to start Free historiation it is for initial limitate Dept do thus 2260 Youngs with Class

BY Class Basks'onn bask Canada

USED Correspondence Courses and Educational Busta Bright of discussed Caland Free Educational Exchange Summericant Caland Caland

TAX Specialists' increase samings' Operate local "Tax-Wise" Service. Train under former C S, tax official Write Tax-Wise. 2015-B Sanford Stn., Lot August 5.

E RAY Technology Homestudy Erland Street Honor Mask.

OET into politica. Erand new course teams how Oet into the hig money came Details Free. Resiliant Publishers. Postomos Box at C New York 51 New York

Murphy 1416 Matie Cleveland 7 Octo

## CONTENTS

47

THE Breaker picture puzzles exposed as ou Wenograd, Box 1485, Philis, 5, Pa

8.00 DOO CONTESTS Pur o tichreater being Write Chiesta, IJA East Red Barn Hew Jersey

WIN Cash Prices in puzzie controls Free details for its Restarch. 30 Church St. New York City 1

## DETECTIVES

DETECTIVE Training Phillips Secret Service System, 1917-C North Menneth, Clurage 30, Lt.

DETECTIVES—Work home—Travel Esperience unbecessary Detective Particulars free Willie Wagoner P-125 West 96th. New York 14

## B LANGUAGE OUTSITS

or published the state of the s

### M SUSINESS SERVICE, INFORMATION, NAME LISTS

WOMEN Mail Buyers List, \$5.00 thousand, Lakeland Sales Butler, New Jersey

BUSINESS Advisory Service. Pacis free Jackson 529 Elm. Salisbury N C

Samples plain 100-500; 1 000 on stokers at 00 up. Write us your needs. R. J. Dunian Box 1046 Colorado Springs. Colo

Olf., wheat and cattle rich Williston Basic Dakotas Parmers of Ranchers excusively current 1000 name lists \$7.50 Pagan-Roland Map Co., 736 C.ermont, Denver Colorado

MAILING Lints. All kinds 1900 se on Dexis Service King N Carolina

## A SPECIAL SERVICES

HAWAIIAN remails, 25c flend for price out on foreign countries, K. Shirabe, per Robello, Honolulu, Hawaii

NOME Assaks, letters rearranted 60c.

WORRYING? We help mave problems Write for information Dept R Pracural Guidance Institute, 7336 Pracy Kausas City B. Massouri

Privile remailed dan Princisco Post mark Joe Priva e receiving-forwarding address available Sha ke Box 3119-Q-Han Prancisco 13 California

MIUDENTS, Oraduates, others changing jobs toire pour prospect to employer a clear and cor use resume of your qualification and absilities for impressive results. Let us prepare that for the control of the control of

### ALTHORS SPRING

NO Luck finding a book publisher Write for Free Booklet PS. Vantere Press. 120 West 31st. New York

BPC: IN NO We era Clet \$2 to \$20 effects daily writing simple children a storics articles poetry in your sparetime Experience unnecessary Our their tributer and Details From W. Herman 70 a Fig. d. C. eve and J. Ohio.

COPYRIGHTS procured prom the finite hature. Rissed. E. Tupper 18 Lyman Beverly Mass.

WRITE Best Priers (Qi ch Histres) Experie are qui espess 7 13 th Ougranteed! Olympic Publishing Co. 1913 Lincoln-Park-Web 216 D Chicago 16.

## ADVERTISING

ADVERTIGE, 24 words, 100 Canadian Newspapers 25 50. Lists Free Advertising Bureau 10511-P Springfield, Chicago 43 USE Sales Letters that click! Letter-

# PAINTING, CHAIR TALKS

master 3J Clifton Natick Mass

HOW To Mass Mosey With Smile Carta is A book every re who has to draw stough have It is noted to ob. gartin but to address Cartoonis it had change their inc. t. Pleasant H. Ohio.

B ALPHARET 3 Numeral pattern sets and raised wood letter catalog \$1.00, Sign Letter Distributors, P. O. Box 101 Mane-

CARTOLAISTS Amateur Protestional Prepare for Animation with Max Plesscher's plan. Write Vera Coleman, 10 East 42nd Street. New York. N. Y.

F.G. R. Drawing sears of er the Famous European methods—Sample leason with 400 illustrations \$1.06 (stamps) Dansoo, Box 1315, Copenhagen, Denn ...a.

LEARN Sum Patieting at Rome Test Levels 7:00 Sen Kerta But \$12-Pd. Oreenville. South Carolina

CHALE Talks, Laugh Freducing Program, \$1.00 limstrated Catalog 19c. Car-

# TYPEWRITERS & OFFICE MACHINES

TYPEW RITERS 822 30 Duplicators adders \$12.65, Meier, 116 Spruce, Wichita T Kansas.

## POPULAR SCIENCE OPPORTUNITIES

TYPEWRITERS Addres Piling Cabineta Office Eq. ip - Wholesa e Re ad-Pres Catalog Depth, Eskay Tib Plushing Ase Brock vn & New York TYPEWRITERS Printing Devices Of-

TYPEWRITERS Printing Devices Office Mach es supplies application Disse Oraph X & N Catonia

White for price but on typewy ere adding machines all office supplies, equipment new & used, Hig savings, Also cameras & sporting goods. Atlas Supply Co. 313 Adams St. Fairmont West Virginia

## MULTIGRAPHING, ETC.

PERSONAL Stationery 300 single shorts 6"x9" 100 envelopes 53 00 postpaté Hammermill Bond No C O D. S. Hauber Stationery Station A. Buz 1163 St. Petersburg Florida

300 LFTTEHHEADS 100 envelopes printed with I to es \$2.00 Cachica 1841 East 2:11 St. Brooklyn. Hew York

GUMMED labels printed for a formplet? Stamp, Arthur Plaher, Taylorville 9 Illinois.

QUALITY letterbeads, suvelopes, Low rates free samples Whiero Printing Co. 125; Ormewood Avenue Asianta Georgia

NAME, Address Printed on 125 6% envetopes \$1 Michel Desires Village '8 Conn.

2 COLOR Byall letterheuds 586 83 86 Bamp et O Yarmest Bereice Hone. & O

QUALITY Printing Anything in any quant y Namures prices from Wilcox. Fortunts Owner a

5000 0x9 CIRCULARS \$16.00, 9v12. 532.00 (Book paper Booksets Posters. Longain Printers, Paulding, Ohio

100 8 vil LETTERHEADS or envelopes 81 06 350 beautees cards \$1 50 Elect 8-2 183 E. Orange New Jersey

prices McDonaid 345 North Outland, Pandena 4 Camornia

100 hcMt) Letterneads 100 Envelopes 100 Cardo 51 50 each lot Persons statistiery 200 sheets 100 envelopes \$2.30 postpaid Komprist, 114 W Wilder Tampe 5 Picrida

LETTERSCHAISS ouvelones statements or billheads 1000-48 75, Samples. Price List Pres. Magnatia Press, Box 1176-8. By but h Ca

1000 LETTERHEALIS OF Statements 5',18 , 13 to Postpari. Semant Press

500 trummed by \$ 214 Labets printed (2000 to 10 to 100 Extra store the Humanian Box 725 EF Maintage on 1 Michigan and 100 Envelopes 52.00 Postpaid Fort Service Sam, see Free Cutain Press. 2519 N Clark Chicago 46 Listots

se LEITERHEADS and 10 Entemper.

## DE PRINTING OUTFITS, RUPPLIES

BO year own printing Save money firmule rules We supply every by it it for a hers good profit. Raised printing like segrat up that Mare home shop. Details itsee Keney Frement, V-3, Meriden, Coan,

MAKE your own, self-molding rubber pr. 1 f c.ts. Pieurubber Argy e 2 W.m. PRESSES, Supplies Paper cutalog lite. Custom Box 111-S. Springfield Missouri. PRINTING Presses, Type Supplies Lists 34, Turnbaugh Service, Loysville, Penna.

## PATENT ATTORNEYS

INVENTORS. For Invention Record form contact Carl Miler Resistered Patent Astronomy Woodworth Bulldord N. T.

INVENTURE If you be need you have an invention we can make a pre im part search on your anventure and advise you whether we think it can be pa erred field for copy of our Patent Booklet. How to Protect Your Inventure and Invention Record form No obegation Mr M rrow Berman & Davidson Reguezed Fatent Attorneys 141-E Victor Bounding Washington 1, D.C.

C A Show & On -5-427 Show Building Washington 1 D C Registered Patent Attorneys, Write for information,

INVESTORS Without obligation write for information explaining the steps and should take in secure a Patent John W. Rands, ph. Registered Patent Attorney 207. Co. up touch Body. Washington ( D. C. up touch Body. Washington ( D. C.

INVENTORS Learn how to protect your invention. Unless the inventor is fam har with patent maters he should engage a competent requirered patent attained or agent to represent him. We are requirered to practice beings the U.S. Parent Office and prepared to serve you in handing your patent matters. Patent Guide for the Inventor, continuing detailed information concerning patent protection and procedure with Record of Invention, form with he forwarded to you upon request without obtiquities. Clarette A.O. Brian & Harvey Jac been Registered Patent Attorness 12% D. District National Building Washington D. C.

INVENTORS Pur Copyright Design and ha ent Guide outland Pacent At grace Messierr 11 West And New York 18

INVENTURA Soud today for borker. Patent Protection for Inventors of the first formation and present hary stope to late toward patent protection area Exidence of Enter for Liem Victor J. Brans & Co. \$41-Q Mercia. Building Washington 4 D.C.

INVENTOR & Oulde" free Frank & Ledermann Registered Patent Attorney 134 Nasaan Street New Yo. &

PATENTS- Irving L. McCathran 316 McLact en B dg. Washington 1, D. C. Reg sterne Pa sut Attorney

INVENTORS When pur are antiched that you have incomed admething of union or to me without obtain in for intermation as to what steps you should rake to secure a Patent Write Patrick D. Beavers Braintered Patent Atty. 938 Columbian Bulg. Washington 1. D. C.

## POR INSENTORS

INCENTORS if you have an invention for sale patented or unputented write institute of American Inventors, Dopt. 36& 431-E St. N.W. Washington & D. C.

INVESTORS: Without characters write for information expendings the steps you stored take to secure a Parent on Post invention. John M. Randolph. Registered Patent Attorney 266 Columbian Role Wannington I D C

INVENTORS For Invertion Record form contact Cart Miller Resident Patent Attorney Woolworth Building, M. T.

INVENTIONS Promoted. Patented of Unpatented. Established 1911 Write Adam Futber Company 121 Enright St. Louis Ma

CARH For your ideas 200 Manufacturfirs need surentions paterized of unputented Last five Invention Sureau 200 S Canton Oak Park Francis

PATENT Secretes \$1.00 68 hour airmail service Parent Applies ions prepared Reliable marketing service Pice Record of Invention, Write Patent Engineering Service, 711 14th Street, N.W., Washington D.O.

INVENTORS. Learn how to protect spurinvention. Unless the inventor is familiar
to P patent matters he should sugage a
competent signs of patent attorney of
agest to represent him. We are registered
to practice belong the U.S. Patent Office
and prepared to more you in harding
you patent matters. Theirst Guide for
the longotor containing detailed inforination concerning patent protection and
procedure with Record of Expention
forth that he forwarded to you upon the
quest without obligation. Clarence A
O Brief & Marrey Jacobson Registered
Pater L Attorbeys ITA D District Satisfies
Building Washington D. C.

INVENTORS Send for 1res patent an formal on book and inventor's record Rematered Patent Attained Associate Examined Patent Office 1922 29 Paies t A torney & Advisor Navy Department 1930 47 Oustay M. let 43PM Warner Busiding, Washington 4, D. C.

INVENTORS For Copyright Design and Fatent Guide contact Mr Meisserr 11 West 42nd New York 18

PATENT Protection This well known organ tation will send tool protectly upon request and willow! the gation is broked, our airing detailed in Imation concerning steps to take to protect your interestion by a United States Paient Steine J Evaluation to Mer o M. E. a. a Registered Patent Attorney \$43-O Mertin Squaling.

the entons of your make a pre minery search of your mention and aditio job whether we think it can be patented field for each of the patent of fire in Project Your Invention and Invention Record form he obligation Mediatron Berman & Davids of Registered Patent Alectory; 141 D Victor Manuface was region 1 D C

PATENT Searches, \$5.00 including Patent copies, Rehable, accurate reports, Free providing farms 40 hour service Patent Ser ce Institute, 945-B Pennsylvania Aver 16, Washington 4 D C

INVESTOR & Oulde free Frank & Lodermann. Registered Fatens Attorney 154 Massau Street New York

PATENT Beatches 55 66 68-hour services Patent April a Jose prepared and Inventions to be ed Record f Invention forms free Wille Miss Ann. Hastings. F.O. Box 176 Wass toglots 6 D. C.

INVENTORS Obtain patents without assistance inventor's Patent Handbook 52 56 Interna total Potent Library FO has 7612 Washington D.C.

CASE of your ideas Complete information how was the Prepared by paperenced matther accenter \$1.00 bill reland provided O W Wood P Charch Street, Laborar Corner New Jersey

OPTAIN patents yourself Eliminate attorneys (see 1/1 renation \$2.00 Satisfaction or money refunded D Davidson \$665 lith Ave. N.E. Seattle 6 Washington

BEARCHES -Put pinz patent searches in the hands of a Registered Patent Atlantes or Ages I as he que these to give a worthwhile patentals ity report Record of shreation form whom request and information on pasent protection Patrick D Bearters Registered Palen Attorney 828 Commissions Bidg. West return 1 22 C

## IL INVENTIONS WANTED

Parented Estab' shed [81] Wille Adam Parented Estab' shed [81] Wille Adam Parent Company 163 & ragnt 84 Lance Mo.

INVENTORS Bundreds of manufacturary have requested our assistance in socialists marketable new products. Complete information free facilities of American Inventors. Dept. 300 431-2 Street, N.W., Washington 6 D. C.

MARIERIANO AIG Nation Wide. Patunted paints pending Bookset free Market Contacts 119-RE Magnetic Tupels. It some no

INVENTIMES wanted Patented unputdated. Tremendous Manufacturers lists. O shall Market be Bervice 1000 Milebell. Oct. and 2 Cast'

CASH Surers for ideas and inventions. Write National Inventors Last tute. 4007 East 171st St. Cleveland & Otio

INVENTIONS Wanted Patented or Patnot Pending 31 years experience Promoting Inventions. National Service Bureau, 3122 Merames. St. Louis 18, Mo

Dive Manual Patents Pending or y Suventors Patent Exchange.

INVENTIONS Wanted Patentell unpatented Serid for free form R. Of berk Adamed Patent Broker to West 12 St. N.Y.

## PATENTS FOR SALE

PATENT 2 003 Tel Double Life Television Tube W & Angelt 225 77th BU Burklive P N T

## 64 MODELS, MODEL SUPPLIES

MCNIATURE surreys stageconches, horses buckboards Free forder Tonts. I Element 18. Cadi.

## POPULAR SCIENCE OPPORTUNITIES

SRIP and Yacht model fittings; hiseprints, fiend 35c for illustrated untaken for 26.—Lesting hundreds of hiems, A. J. Fisher 1002-2 Stownh Royal Oak, Mich.

MINIATURE furniture kits. Solid shelvy Easily sectionic. Large processon Cat Mr. Culver Miniatures 184 61st Miagare Pails New York. Dept. 6

STEAM engines to seen cast ogs Catales like Auton Behabuy 2307 Price Rahway N J

BOATS Care A minnest Complete Power of Kills Write Hobertand Box \$27 Cleveland 27 Obs.

SHIP Modess Ltd Kits, Strings, Plans, Custom Work, 1953 catalog 25c, Bez 751, Brockline 47, Mass

### 65 BOME CRAPTSMAN

MANZANITA Seast (a) hardwood fan tastic patterns and forms, Lamp plece \$2 of postpard Mack Whiskeytewn Castforms

so All new Jult size lawn ornament and sovelty patterns, up to 30" high. Only \$1 90. Mastercraft. \$28. Tota Otcots, Chicago 31 Historia.

LEATHER, tools, incing supplies, Proc Catagog, Rational Randscraft, 100 William St., New York 7

PRACTICAL Painting Wood Pinish ing atoms in who get p of each of results Furniture it should wonder a projects house deducts in frame of Modern house and authorities there are never seen. Write House Craftsman 113-P Worth St. N. Y. I.J.

Bits mistry assembling driftwood a not 6. Patchett 2101 H W 26 Court Minm)

OUR bragest I saliner and Craft Calaing pet 1800 a of Hours Stend Me refunded with lat neder). Russia Mandacraft Supplem Dopt 100 345 & Spring Lee Angeles Ca fortin

Corn in everything for Enciperant Lawrent prices Commune (refine) stamps Cutaing for Cr wa Louther Company 23 Syruce Street New Y on 38

PLANTICE home craft course for Mrs. and Women To a and shows now to make hundreds of fast set of plantics produc a A. plantics and materials for 22 projects included in reserve No special local homeofold Course part for that I write for Piece bucket Le estate Training service. Dept. 102 F. Portant 12. Oregin.

BUY wholesale nationally advertises power based to a thesase of other products at his discretize Pres Whilesale Pair American Buyers \$36-Ph Lindon Buyers 14 New York

LEATHERCRAFT Metal Tooling, Teaule Painting Benderal's Shelltraft Muny other trafts See d for Free log 1 funt, ated catalog teday! Kit Kraft, Hollywood, 44, Casif

100 PULL size Jig Saw patterns of beautiful shelves, ornaments, toys novelties plus "How Where to Sell" Only \$1.00 Mastercraft 648 7841 Olcott Chicago 31 IU.

LEATHER HAPT For Pleasury or Prot-R Make rasy to assemble putner be to gloves woodskin tone 100 other tiems for gifts or to sell flend like today for his patalog Largest freshereralt stock to U.S. J. C Larson Co. 836 S. Tripp. Dept. 3186. Chicago 24

MACRETS, Permanent Alnico, Never Posts Bagnetism, Many uses, 12 for \$1 00 Pritt Co., Dept. MS-5, 12 West 27 New York City

PLEXIBLE Paint. Amering Remonts makes were leather leatherste look like new, Use an uphontery luggage aports equipment, canvan decks at a ion wagon tope, etc. Natural looking, washable waterpring Won't crack peel hown languages, light blue, ferry blue, rad, white, black, clear d-ox, eve at 00 purposed Pint to M No C O D Wagne Products Company 757 Maw-thorne Dept 161 Frankish Pask Historia

REPAIR Opholatered turniture at home: Professional Kin astitutes all unpplies and instructions to rebuild sent hotoms. Chair II of Bofs 46 78 Postpaid J R P. Pirriture Products. 193 Bay 34th Street. Bruckeys. In. N. Y.

KNOCKDOWN coder chest and lumber free price list. Bedford Lumber Company Shelbyville. Tennessee

REFIECTORIZED movelities bring his may profite Sarries and print as the fundables Manuart Torus Clock Penns

LAMP size express knee \$1.00. Cy . Products Dept. 5 Lafagrage La

GOLD full for inscribing gots Sample 25c Artifit 1917 Hay Kutcha Cafe oft a

MAKE wear own leather articles of measonal use. Your leather by is by folds purses, made at home brings pleasure to all includers of the Jamily Free Catalog Tandy Leather Box 307 D Tuke, Okta

CUSTOM nameplate energies of Pres in formation. Victor Engraving Service Mentila Park. New Mexico.

ENOCEDOWN Coday Chest Law ber and Veneers Free Price Last Gles Cu.

6) 60 Projections) distring quarty purious \$1.00 Projections) distring quarty purious Puls as a state of the test of the test

LEATHERCHAFT Tools, Leather Embons of Places Craft Acress to Dies Cafa cappe for I am Jones E grove of Community and March Feet Worth Jeans

SQUARFENOTIERS Make beits, handbags leves de dog lenshes, etc. Special effet! Beginner's book, entajog and quality cord samples 15c. P. C. Herwig Co. Lies-t Pt) 121 hands St. Brook en J. New York

CIRCULAR Sand sharpened perfectly prolessions by whenever necessary with 2 sample house to in Piece 52 60 Rudrich, 2-6 Paris. Chicago 6.

ENOCKDOWN space cabinet \$1.55 Other has select the Mile 5502 Clemune Road Charlamoge Termore

COPPER I'm i g Statter Kit Conterts
Two saff Copper Aberta 6 Des s a
Maple Test its rection Booklet at 66
Platicald Complete for ing Supply Calaring The Free with Kit Broundmanus
Company Div B Boulder Colorado

10 PULL Size Shelf Patterns Sic. Consolly's, \$258 Randolph, \$1 Paul 3, Minn

LEATHERCRAFT New Stylecraft Inider From New Kits Ultratrated Filipse Betts Billfolds Purses atc. Send 25c new on a log Re unded first order Apache I on her Co. 2004 East Washington &t. Phoenia Artivola.

## BUILD IT TOURSELF

Bi'it D Your Own "Business" Free infor-

ARTO for his new 1853 illustrated extrabol that will show how body to light some apart time into each emoking spick-pellice had a profitable ample Every home a prospect. Hundreds do in the rost case two Miles present doors required that experience of special tools required that shade transports become composed with shades shade transports become composed and create hundred composed and strains composed and of section a funds of section of surface hundred and when parts everything you need Special a page section amount a brantful tamps in a toform ready to assemble You buy who easie set at retail that the profit is by such a first and the section of the section of the page of the complete of the post that the restricted of your first profit the page of the section of the total of the page of the section of the total of the page of the section of the total of the page of the page of the section of the total of the page of the page

SCIED Crystal Rad a Sepantional Mr. on to Cristal and determs in the matrice links and prime 50c postpaid Sat rection guaranteed, Alex. 427 PSS, Chinese M. security

ORANDPATHER Clock shoptested plane drugt Thousands bill Kuempel Clocks Minnespells 16

Strike Your One Organic Shredder Save over \$100' Big Capacity Power Driven Convers garden water into ideal compact or Solch Santonial Plans \$2.00 Organic Shredder PS-663 Box 36, Valley Stream. New York.

OARAGES. Camps, Building Construction Made Easy Send Only \$1.00 to Save Time and Money Bathyst, P.O. 2457 Schenectady New York

PAIRWAY & 2 curt Build it soursett eave ; cust I am raied instructions 2, 60 resunded on first order for parts) Write Buly's Service. Cedarburg, Wisconsin

BE LID your own ornamental tens porch far aid Mare 8886 Complete plans 6 00 for ry Box 45 Fond du Lat Wisconsin

PONCHUTE Block Homes IP page bookers on he to build \$1.00 H C L on not City Englisher Richbors Penh

## 7 QLD GOID, JEWELMY, WATCHES, ETC.

HIGHEST Cash Paid For Old, Broken Jeweiry, Gold Teeth, Watches Bilverhare Diamonds Spectaces Fast and Procuse to maken he is action Contained Russ for the Company 28-Y fast Madian

JEWES BY making Ford 200 for 13 opfrated rations M ady-Pair Co. G.F.O. 13-8 No. 9 York C. F. 2

Som JF WEI RY styles you can easily made you self Pare Barrings Brace eta. He as brutened bushmares. Protestants and cuttage the Barrya 148 Ardings Court Newart H. J.

SWISS watches from importer For resale only, \$3.30 up. Catalog Transworld 565 5th Avenue, New York City

RHINESTONES, jewelry settings, camcon sequent heads field the tor Ji setrated Campa J & M November Dept. CO 4 G Tan Indiana

## TUBACCO & PIPES

TERRIFIC Pipe Values Below Whosesale car Write for Pres List Dismand Er express \$11 Southwest \$0th Court Mann F stells

RAND Made C gars. Write for price ust. Ideal Cigar. 1963 Februaka Talupa, Plorida,

## FOR THE NOME

40

RAPETY first with the new Rib Bourinterviewer. Options design pr vides wide with the \$2.95 Proc terature Scaridia. Direct Saids. P.O.B. 663 Vancouves & C. Catada.

Worder Windows Tests \$0.000 P & | \$6.50 to rate product Tests \$0.000 P & | \$6.50 to rate product | \$6.50 to rate product | \$6.50 to rate | \$7.50 ppd Count All windows buy to sett of \$7.50 ppd to rate | \$7.5

POAM Rubber Puratture Customes Pattery Seconds 16 discount Prices Free Perms From 150-A Mash Street East On se New Jersey

CESSPOOLS, septic tanks, outdoor tollets cleaned, decdorized. He numping deging or moving necessary Inexpensive Details. Chemical Compost Cleaning Co. Boston 34. Mass

## 76 OF INTEREST TO WOMEN

WOMEN Who Sew! Invisible Revesving be for you! Up to \$18.00 profit per hour to space time. Earn as you learn. Pay as you earn, busy demand quarantees sarn late. Dota is free Pabele to Dept. Def. Line, & Pennie Chicago in Directs.

PART Time Women to nork in their horem 3 h hrs per day Mailers 4043 M. Guir ave Depr Pt Clere and Ohio

## 71 FOR SALE MINICELLANEOUS

FREE catalog on poversional surplus bargs as from country a jurgest surplus of a sutdoor sporting in suidoor sporting goods, righting tempeting equipment Texts subber heats tarped on them flat landereds of other lights. Rocks what have been Jersey.

NEW pressure socialize tape glows a because end when I got strikes it Large 24"x1" piece only \$1.00 Serson Print Producia. East Point, Konincky.

## POPULAR SCIENCE OPPORTUNITIES

STANDARD full size ball point pen 26 cents arose \$13.25 W Liam Anderson. Box 835 P O F Mountain Home Tenn

SPECIAL 29 piece Domen' Twist Drill Set Pinest quality steel for speed, durabuilty Sized 1 16" to 'y' by 64ths Complete with stand, \$18.00 Regularly \$14.55. Banford Sales Co., PS-6 176 Broadway New York 35, H T

19 POUNDS Stainless Steel Shorts assorted ages only 67-30 Prepaid Send M.O. L. J. Michles Ou. But 111, Premont Ohio.

SALE' New merchandine Anything's Send eard lewest price any Item Dick man a Box 301 March etv. le New York

STOP searching for that number House; numbers that glow in the dark Send \$1.00 to Nate Grow Arts, 1755 East 6th St Brooklyn 21 N Y

REFLECTORIZED House Numbers for your lawn, visible Day & Night. Durable all Aluminum. Up to four numbers each side \$1.55 Postpaid. Lite-Up Signa. Inc., F.O. Box 5145 Duriport Pla

## 78 WANTED MISCELLANEOUS

SCHAP Mercury (Quicksilver) esta tamera supplied Tantaiom Biolineth Tuigitien Meraturgical Products Co Entablished 1906 35th & Moore Streets Philadelphia 45, Pa.

VALUABLE Come Bought Descriptive Catalogue 30c R-1115 Chestoni. Saginaw W. S. Michigan

Highest prices paid Details Iree Harry J. Major at Englewood Cuffs Sen Jersey

## 74. MAZOM BLADES, SHAVERS

116 DOUBLE using Rasor Blades \$1 00 pestpaid Economy Service, 1412-W Great Morthern Bidg Chicago 4, Illinois

## 16 TATTOOING BUPPLIES

TATTOOING Course and Supply Brochures 25c, Zeiss School, 725 Lesley Recetord Linets

### 76 DRAWING, ST PPLIES A EQUIPMENT

DRAPTINO and artists' materials entalog thousards of items—25c (deduct)ble first \$2 arter) Onedon's, 219 Madison Citicago

DISPENSAPOINT New development Improved draftsman's pencil pointer \$1.00 Inistrated information. Reed Co., 3001 Fourth Boulder I Colorado

## TREASURE PINDERS

77

TREARTHE Bunters' New 11-pound featherweight Midel 101 locator for a id allier and othersia Money back specialise for a radius prospectors Complete intermediate The Ocidak Company 1560 W Olements Bird. Ocidak Company 1560 W Olements Bird. Ocidak Company 1560

ART RCTIVE metal and mineral despeter Revolutionary design Distinguishes metan from black magnetic sanda Readtly desects metals under salt water A so Oviger Counters Pres literature Gordiner Electronics Company 2016 M Dayton. Phoenix Arizona

COLD Stiver Metal Detectors Origina Counters for Urational Minera while Sentention in the Printe Information Free Detection Co 5420 Visitiand Ave., North Holybood California

LOCATE Hidden Treasure and metal with the Model 100 detector Weighs 5 pounds detects 94 square inches of metal distinguishes minerals from metals Available inches minerals from metals Available inches minerals from metals Available inches minerals from the 10 pt (134 99). Kit includes clearly lituatrated construction procedure tubes batteries headphones transformer electronic computants, drived chassis nothing more to buy Unconditionally guaranteed order today Remit 25 - with COD orders Dept. O Electronic applications P.O. Box 1978. Washington 8, D.G. Literature on request.

TREASURE-M-Scope Origer Counters
-Mineral Locators, Why buy something
inferior when you can buy the best at a
lower prior? Backed by years of experience. Pully guaranteed by factory. Detects
minerals, metals gold, silver coins, Payment plan available Proven superior performance Free 16 page Huntrated booklet.
Fisher Research Lab. Inc., Palo Alto, Calif.

SXXK Gold. Urapium. Tremure! Latest super-sensitive detectors. Circulars free Gien Scientific, Box 151-D. Glen Lilyn. IL.

### 0 WATCH REPAIRING

WATCHMANERS - Jewstern complete informative estatogue 30c Bengal Company Culver Ct > California

WATCHMAKERS Tools, Materials, Supplies, Repairs Catalog, Cales, Son 1008 Chicago 50 Illinois.

WATCHMAKERS' Journal contains helpful hints on watch repairing \$1.00 year Sample copy 20c Dean Co., Box 1218, Daytona Beach, Pla

6 ELOIN, Waitham, Illinois, Hampéen Oents' wristwatches needing minor repart \$16.00 Write for prices E. Lovie Hohand Bidg St Louis I Mo

REPAIR Watches Clocks at home Permanent professio business cash; learned historic clock Repair Course 25c John H. Roach, 667 Chester Resark Ohlo

WATCHMAKERS: Beginners' Watches Movements. Descriptive list Box 150 Chicago 90 Illinois.

## YOUR PAMILY COAT OF ARMS

OBJECT of Pride and Distinction for Home or Office. Make your own copy-terrife savings! Also use Design to Personation. Beau ify any Craft-Item. Det Authentia Beraide Description full Chie Shorten page ine drawing to set working pa term of Your Parent Emblem will for only \$5.00 Give Bathonslay atternate speaking of surname Charles 5 Bure Head Station. Recticater 11 Pr. New York

## TP MENCELLANEUR N

ADDRESS and wall protein Make over 5to week Soud 5) for instructions Lundo Watertown Many

CASTRAS wheels and dollars—all makes types and sizes largest stock in New York Prederick Picter Corp. Dept. 8. & Warren St. New York 7 New York,

FICTURE Post Cards from your Photograph 1998 611 68. Raum s. 4154 Putch Birect. Philadelphia 60

STAINLESS-steel pot cleaners guaranti-

RECEIVE Magazines samples catalogues Mans from everywhere Offers hundreds, Get Lated 250, Bertelt, Box 86-M Cinclanati 24 Ohio

PANNING Gold lesson—Catalogue Beeinners supplies, Mining Books, Maps "Where To Go" Free, Old Prospector Box 19203, Lodi, Calif

ZOUNDS! Such Interesting mail! Name listed sor Supkuw Blackwood New Jersey

NEED Money? Take orders by mail field stamped addressed encrope for in formation. Associated Maties, 193 North Clark, Chicago I

300 BtG Mails guaranteed samples offers mans propositions, 12 months listing \$1.00 (refundable) Wright Publications 2276 Rubbard, Memphis 6 Temp

TRIAL 25 word ad in "Western Trading Post" 25c 13100 Third Northwest Seattle

BE the Erst in your town to open and riose such and shlock your garage door four fitty feet or more by radio control either from button in ear at house Easy to install with a few simple tons on most overhead doors. Now buy direct from world a largest manufacturer of the popular V-type friction drive operators using \$4.60.50 Write for complete in ormation. The Door Masters Inc. 1836 Because Street. Santa Monica. California.

BIG interesting mails three months 26c.

VIBIT I sly Ha and Ire and by preasy Four persons pas cards remained \$1. Roberts Box 67 Cratgrain Many

YOUR Leather Jacket renovated expertly Free circular Berlew Mig. Co., Dept., 7 Freeport, N. Y.

URANIUM Simple new field test identifits uranium on-the-spot. Saves assay from ---approved by AEC. Kit includes rare lithium flacride, Free list radioactive minerals, \$5.00 postpaid, Atomic Chemists, Inc., Box 1634. Branford University Calif.

### PERSONAL

DETECTIVES Opportunities Detective particulars from Write, Wagoner, F-128 West 36th New York 34

HOW Can I Fird Out" You Can Information confident a y developed Any mat er person or been World-wide Or. fir a 2 licensed Established 1922 William Herman, 116 Broadway New York

MEXICAN legal matters. A Kapajo, Box 234 Hermostilo Sonura, Mexico.

BORROW by mail Loans 650 to 5600 to contraved men as d women Easy quick Completely confidentia. No endorsers Repay in convenient monthly payments Details free in plain envelope. Give occupation State Pinance Co., 323 Securities Bidg Dept C-14 Omaha 1 Nebraska.

INCREDIBLE! Become Mental Superman Overnight! Pres Bookist! Bijon. Box 1727-V6. Hollywood 26 Cultiornia

4 TAHITI Postcards, Remailed free. 11 00 Ives Jarmillon, Poste Mestante, Paperte, Tahiti.

LETTERS Remarks Repries forwarded me each, Lenza, 3123-B Arisons, Santo Monica 2, California

YOUR Questions Answered, Research, Business, Social, Any subject, Confidential, Write, Dougherty, Box 65-K. Van Nuy's, California

LOVELAND postmark remails from Sweetheart Town 25c, Luke Montors, Box 176, Loveland, Colorado

DENVER Remail-Zor such letter From the Snowtespeed Rockies, Noz 6344, Denver 14 Colorado.

IF you are nervous, write The Merb-

LOS Angeles Postmark letters remailed. Pool Priends, 25c. Private receiving Forwardion address available from 1-2602. Los Angeles 25 Ca for in.

REMAILS from New York Objo Plot-Mt. Carroll in Ind and Kentucky Catada 25c Ergistered 5: 00 Schroeder 187 Delta Cinc mosti 26 Objo

HYPERTELL poetet pushmeter high bood-pressure alarm Extremely faart-naturg life and money saving for self and o'here \$1.00 post pash-free forder available Hypertell. But 330 Onuse Dam Washington.

E MAY Mind Dangerous power over others, Inquire, Send do, Krishnar Institute, 1912 Lincoln-Park-West, 216-83.

"INTERESTING Mails"—35c heeps your mail box full three months, Bents, Desk-I 27 Chatawa Mississippi

CHICAGO Letters remail 25c Flord

RAND Guide Corrects your Penmanship, in 10 hours. Write Perfect Penmanship, Sox set- 12P M. Louis. Missouri.

MEXICAN Law Octoral Practice Atlutney 1203 Arianna Street, El Paso, Texas.

DRUGLESS virilprop restores confidence point dignity or money back. Student doctor invention. Psychological effect termine Sample \$2.00 No pitrature of COD 5 Plants Aria Life. Box 30H Sandy Springs Georgia.

\$1.00. Jost Rabade, Aperiado 3464, Ha-



## **OUTING PALS**"

for More Fun Wherever You Go! Easy Meals...The Coleman Camp Stove cooks like a city gas range. Instant lighting. Two and three-burner models. Safe; help prevent forest fires. Fold up like

More Fun with the powerful Coleman Lantern. Floodlights 100-ft. area. Lights instantly. 8 to 10 hours lighting service from one filling, Safe; stormproof. Coleman reflector makes powerful spotlight.

## NEW Coloman Folding Picnic Table

and Carrying Case sets up in a jiffy on acrong steel legs. Big 28-in. top. Folds into carrying case (28-in. x 14-in. x 6-in.) with legs



MAIL	COUPON	TO

The Colomes Co., It Dept. 203-PS2. Please send me my free copy of the new Coleman Quitdoor Book.

Nome.

Address

The Original and Genuinal Accept na Substitutest

Magnificant super funurious binnt platel with gleam by chrome finish.

4 Ejects "emption" automatically, • Feather touch trigger soil-

o & shott-majatine in handle.

Amusing value at only . . .



Looks feets-sounds like "the real thing But car I beto regular car-tradges deshot magazine Safety catch, Preciation built of carbon steel. Speakellound dew Jew print



BLANK CARTRIDGES. .. 100 for \$1.50

ORDER BY MAILI No Police Permit Regulred FROM CHARGE OF BARRIES PARKET

I. Walle Fig. 10.34 mic. they i Preside Chambers St., N.Y.C.





## FINE BOWS and ARROWS SELECTER BAW MATERIALS

Catalog 50 send for it HAND BOOK-Hivstrated

Instructions on Making and Shouting Archary Tackin-78e

L. E. STEMMLER CO. Monorville (Box 1) L. F. N. Y.:



Write for complete information, Dept. 3106 SCHULT CORP., ELKHART, IND.



regular 110-volt current for trailers, homes, farms, cabins, resorts. Air-cooled, heavy-duty engine. Costs less than any other complete electric plant,

WRITE FOR FOLDER.

D. W. ONAN & SONS INC. 6752 Dair, S.E. - Minneagada 14, Minn.

 Quist-running = Fits In email spore \* Vocuum orr-cooled engine and generator a Lightweight Completely equipped



## **Preferred at Famous Fishing Spots**

Norfork Lake, Arkansas
for Battling Bronzebacks

## POWER GLASS-RODS

...lithe, live, lifetime oction...

lighter...stronger...set proof

Bandon Srience - Finest attengent spinning test in the market, with greatest capacity for heading 4 to 18 lb test Nylon line. Anti-triction bearings. A amistan bear and specific strength and lightness. \$17.10

**H-1 POWER GLASS SPINNING RODS** 

Glass with fly seel seat below cork grip. 2-piece Tubular Power Glass with fly seel seat below cork grip. \$18.00

WUOSON, No. 2216 — I-prece Tubular Power Glass. \$15.00 PEERLESS, No. 2517 — 2-prece Solid Power Class. \$14.00

From butt to tip-top these Glass spin rods are the finest on market today. They're lithe, lightweight, yet their exclusive H-I Power Glass construction gives them easy, effortless casting power.

Remember . . . all is not glass that glitters . . . there's only one line of Power Glass Rods and it's built by H-1.

Old Hi Soys:

"Look for 💶 🕨 on the tackle you buy"

FREE—Old Hi's Famous E shing Book Write today for your copy H I Co., Utica, N.Y., Dept. 22

## HORROCKS-IBBOTSON COMPANY, UTICA, N.Y.

Manufacturers of the largest line of fishing tackle in the world.





The season t best boat sit buy? Pre assembled frames all parts cut to size and shape for speedy assembly Select Philippine mehodant, seasoned pab, marine type playood used throughout All brets wood screws it ustrated instructions. Beam 51 depth amidships of 2 technology for FREE brochure.

PENNEY WOODCRAFT INDUSTRIES

208 Parry St., Dept. Pé-

Defiance, Ohio



## #3 HAWAIIAN WIGGLER \*CAN'T CATCH WEEDS—CAN'T MISS FISH"

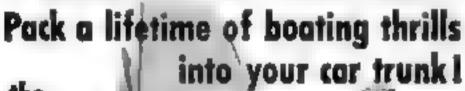


-saye Vic Simich. Akron, Ohio. "I took these 6 Largemouths in short order here at Mogadore Reservoir on your #3 Hawaiian. You can't beat the old #3 when it comes to thick cover It wiggles right through woods and susbou where you couldn't use any other lure and that sensational Hawatian action really brings out the big ones" Caste like a bullet, even in windy weather Choice S colors, price \$1 15 ea. With spinner for extra frash and action, \$1,25 ea.



FREE WRITE TODAY FOR YOUR BIG FREE ARBOGAST COLOR

FRED ARBOGAST & CO., INC.



the KLEPPER unsinkable AERIUS folding BOAT

This great folding boot agts up into a trim, sleek 17 footer that corrise as many as 4 people. In just 10 minutes, it's ready to cruse in any waters—salt or trush, smooth or rough. No clubhouse or docking fees; the Agrius packs into your car trunk whetever you go.

unistrace air tubes but in all around the purwales make the Aerius unatchapie. It a safe enough for a child to handle. The Aerius has a tough resilient built of multi-ply rubberties construction on rugged frames of seasoned mountain ash and plywood. Never needs parenting or caulaing.

winter title. The Acrius tacks like a dream under sail, literally shows over the water with a light outleard, padd so better than a fautherweight cance. Perfect for shooting rapids:

Farment implerers including Byrd, Sven Hedin, Amundage and others have chosen the Arrais for rugged depends, birty Acciaimed by sportamen every where for hunting and fishing, and for boating thrills?

KLEPPER FOLDING BOATE BEADY TO LAUNCH, from

In New York, visit our showrees.

ELEPPER COMPANY

Best, AC, 1472 Breedway, New York 10, H. Y.

## AMMUNITION



Reload a whole carton for the cost of a few rounds of factory ammunition. Shotgus shells, rifle and pistol cartridges can be reloaded safely and easily with an inexpensive set of famous IDEAL Reloading Tools. Send for free literature.

## THE LYMAN GUN SIGHT CORP.

690 West St., Middlefield, Conn.

Once used in deadly combat now on

Once used in deadly combat naw a tracking sport! Learn right at home fun safe educational. These swards are made of fine blue spring steel, patished mate!

cational. These of fine blue had mate! guards, turned handles, rubber safety tips Fencing teaches quick thinking develops coordination, posture. Since the Middle Ages, Europeans have enjoyed the sport of dueling, "Now advocated by U.S. co leges. Set includes two swords and the booklet, "The Art of Fencing" Special arise. MONEY BACK IF NOT COMPLETELY SATISFIED At sporting goods dealers or send \$3.98 to

OF TWO



TECHRITE CORP Box 12 T South Pasadeno, Carif





ORIGINAL FOLDING BORT



HERE'S more power than you'll ever need ... power that "steps out" over country highways and "loafs" through city traffic ... plus luxurious riding comfort that means mile after mile of tireless travel. Yes, the '53 Harley-Davidsons are packed with features to give you more pleasure, greater safety and more

comfort . . . it's the handsomest two-wheeler on the road. See this beauty at your dealer's soon . . . and bring along a buddy. Or, send for your copy of the thrilling, action-filled EN-THUSIAST Magazine and illustrated literature. Enclose 10 cents. Harley Davidson Motor Company, Dept. PS, Milwaukee 1, Wisconsin.

## FOR ROUND-THE-CLOCK AT MINIMUM COST!



Get the amazing

## GRAFLEX

CIRO 35

## COLOR OUTFIT



 You needn't spend a penny more to equip yourself completely for color! Night or day, rain or shine . . . you'll make gorgeous slides for little more than the cost of ordinary snaps. Range-finder focusing makes fuzzy shots practically impossible and your Ciro 35's coated, color-corrected Graflex f/3.5 lens assures all-over picture sharpness. Count its other features too, including no-tear film wind. You'll be amazed by the all-metal Ciro 35's terrific valuel



See your Graffex dealer today or write Großex, Inc., Dept. 72%, Rochester 8, N. Y. -- for FREE literature.

## GRAFLEX Price-Winning Comment



MODEL 1-UCO, shows, feerures 11/2" square able of solid steel. 2500 lb. capacity. Comes completely equipped, except for tires. List price \$65.29 postpaid (when paid in ad vance). Other models to 5000 lb. line of trailer paris, write for Brochure

HAMMER BLOW TOOL CO.

" is old as the industry?"

WAUSAU, WISCONSIN

## 10 DAY TRIAL OFFER for all who wear glasses

OPTICALLY CORRECT





Our Money Cack SURRANTEE projects you Try Eur C p sun glasses for 10 days it not deligabled simply return to Esc-tery for full refund

Here, at LOW COST OFTICALLY CORRECT, anap-on long for your sys planted. Procusion made of special scalars type green index unbreakable Pies class plant a fun-Cilp states repel act nic sun rays. STOP GLARE, W.) not distribution on six sermain frus. There is no EYE STRAIN, you can wear Sun-City States ANYTIME Handsomely styled, faitherweight perfectly atyled, faitherweight perfectly for MONEY SACH SUM GLASS VALUES IT your drug or described store cannot supply Sun Cilp, send \$1.50 direct and wa'll ship peatpaid by return mail. by return mal

DOMAR PRODUCTS, Inc. 9002 N. Erie St., Massilles, Ohio

## WORLD'S LARGEST SELLING PLUG

HEVEN MILLION SOLO ....



There is only one reason why the Flatfish outsells all other plugs year after year. It's because fishermen have found that It can be depended upon to deliver the goods. Try it and see how it will help you

catch more fish. Get it at your tackle dealer's or write for 48-

page book with fishing secrets of famous anglers.

MELIN TACKLE CO.

3669 Meldren

Detroit 7, Mick.



On new super-highways, RCA purrowave and RCA mobile radio help control traffic flow, help police trap lawbreakers



RCA microwave herps oil compenter move more oil through pipelines and booster stations.

Like a pole line in the sky, the RCA microwave system gives industry, business, transportation and police a new, more efficient means of communication.

Needing no wires, economical to install and maintain, RCA microwave is "weatherproof." Wind and rain almost never affect it and, obviously, ice won't form on a radio beam to put it out of action.

Useful wherever man must communicate with man, or control industrial operations, the increased efficiency of microwave is another example of RCA leadership in research and engineering Such leadership gives you better value in any product or service of RCA and RCA Victor.



\*RADIO CORPORATION OF AMERICA

World leader in radio-first in television



driving in inches of water! No more fishin' the fringes. Go right in

It's a rugged little number—a genuine Johnson with genuine Johnson DEPENDability. A smooth Perfected Alternate Firing Twin that gives you the punch of 3 solid horsepower. Yet it weighs only 32 pounds Pick it up, carry it, stow it-like a tackle box! You'll agree it's the handiest package of power you ever clamped onto a boat.

FREE! Write for new Sea-Horse Catalog Describes the 4 great Johnsons for 1953 See your Johnson Dealer Look for his name under "Outboard Motors" in your classified phone book.

JOHNSON MOTORS, 500 Pershing Read, Woukegan, Illinois In Canada: Manafactured by Johnson Motors, Peterborough

## FOR 1953 - 4 GREAT ALTERNATE FIRING TWIMS

SEA-NOESE 3-3 hp. A great takealong fishing motor! . \$145.00"

SEA-HORSE 5 - 5 hp. Neutral Clutch. No sheer pin. America's largest selling outboard \$197 50"

SEA-MORSE 10 -- 10 bp. Gear Shaft, Mile Master Fuel System Twist-Grip Speed Control Brilliant Performancel ... \$275.00\*

SEA-MORSE 25 - 25 hp. 98 lbs. Gear Shaft Mile-Master Tweet-Grip. Over 30 mph! . \$190.00\*

SHIP-MASTER REMOTE CONTROL. Shift-and-throttle Soap fittings on Sea-Horses "10" and "25" \$29.50\*



\*Prints are fob factory sub-ject to change ORC Certified brake hp at till rpm, Weights are approximals,

Johnson SEA-HORSE



THE ONLY MANUFACTURES WHO HAS BUILT A MILLION OUTBOARD MOTOES



## WILBUR SHAW REPORTS "FILL'ET UD with Fuel Oil"

A TAXI driver pulled up alongside me at a red light the other day and gave my automobile a quizzical goingover from front bumper to tail lights.

He had good reason. My engine was making with the noises like someone rat-

I was driving one of the few Dieselengine passenger cars in the U.S. It pings like crazy at idle. That's because the onfices in the fuel-injection nozzles





AMONG THE INSTRUMENTS is a glow-plug indicator lamp. It has to get red before you start the engine (see the panel at right). Battery-heated, plugs start combustion.

are sized for faster operation—at low speed the fuel isn't vaporized properly for good combustion-by-compression.

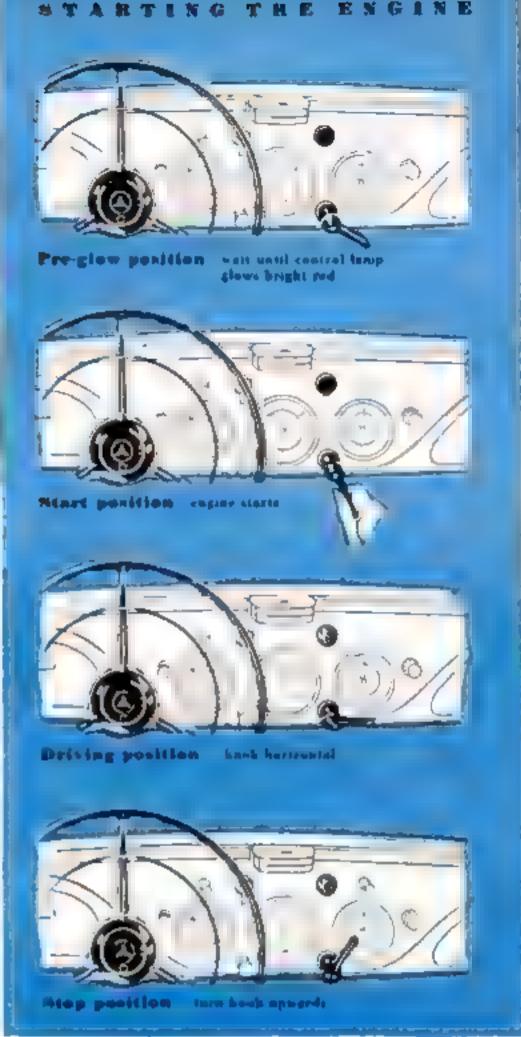
The engine may rattle, but this car will chug from New York to Los Angeles on \$12 worth of fuel. It will run practically forever without attention. It will never have to have its valves ground for carbon. Its owner will never have to replace spark plugs or file the points on the distributor—it basn't got any.

Economy, efficiency and trouble-free operation are Diesel characteristics. That's on the credit side. There are debits.

I borrowed this Diesel car, made by Mercedes-Benz—the same people whose gasoline cars took both first and second places in the Mexican Road Race last fall—from a New York physician. Dr. A. Schmidt-Baeumler bought it for the same reason that a man without a lathe will buy a set of turning chisels—he just likes Diesels.

"You think I'm crazy, eh?" remarked the doctor. He was poker-faced and I had to look twice to see the laugh behind his eyes.

No, he certainly wasn't crazy. His automobile, made in Stuttgart, Germany, has conservative styling that will look good



10 years from now. The workmanship on it is superb. It's of a size that ultimately we will accept in the United States. And it has performance that only owning it can prove. Remember that performance covers more items than take-off and speed.

The good doctor had to show me how to fire up. The engine started right off. The first thing I noticed was the noise. That stopped as soon as we got under way and I put a few more revs on the crankshaft.

Acceleration was slow. A little gaso-line-powered car beat me away from a stop light. A Diesel won't wind up as much as a gasoline engine. The top r.p.m. on the doctor's Diesel is 3,300. That on a comparable Mercedes-Benz gasoline buggy, with exactly the same piston displacement, is 4,200.

The car didn't do so well on hills, either. I had to be fast with the gearbox to keep from stalling. That's on account of the low horsepower—a mere 40 for a car weighing 2,800 pounds, about the weight of the new 104-hp. Hudson Jet.

But what would you expect from an engine delivering upward of 35 miles on a gallon of fuel that, incidentally, slugs you only half as much at the pump as premium gasoline does? The Diesel's top speed is around 60 miles an hour, but that's also its cruising speed. Just open 'er up. The engine was built to take it.

The doctor and I presently drew up at the curb. Not thinking, I turned the ignition switch to stop the engine. Nothing happened.

"Here," the doctor said. He turned a valve on the dash, That shut off the fuel. The engine stopped.

Back home, I looked up the pedigree on this car. It's the only Diesel passenger car in mass production in the world today. Mercedes-Benz makes a thousand of them a month. Dozens have been sold in the last year or two in California. That's because of the vast amount of Diesel trucking—the fuel is available practically everywhere. In the Midwest and East it's a different story. The doctor has to hunt for a filling station to serve him. And, particularly in the East, fuel prices are higher.

## Diesel's Not Low-Priced

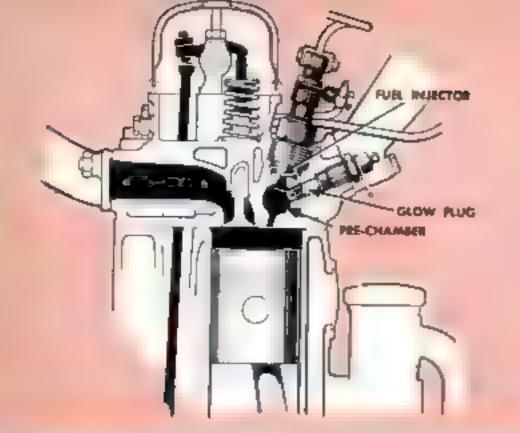
The car isn't cheap. It retails for about \$3,600 in New York. Part of that cost is in expensive fuel-injection equipment. Like the Diesels made for trucks and buses, the most expensive single item on the Mercedes passenger Diesel is the fuel-injection pump.

The Diesel is an entirely different kind of internal-combustion engine from the gasoline engine. A gasoline engine converts only about a fourth of its fuel into power. A Diesel converts more than a third, Less heat (and therefore power) leaks from a Diesel's cylinders out the exhaust pipe. The fuel burns more slowly, and the long-stroke piston takes more advantage of the gas expansion.

A Diesel is more efficient even at light accelerator pressure—at low engine load, as the engineers say. That's because the

Mine host, Dr. Schmidt-Baeumlee, and his Diesel. It looks like any other car, doesn't it?





## Here's What Makes Diesel Go

The cutaway shows how the Mercedes squirts fuel into a "pre-chamber" instead of into the evlinder proper. This is to preheat the charge and get better combustion. As the fuel starts to ignite, temperature and pressure build up, spewing the rest of it into the evlinder. Just before combustion starts, the temperature (1,200 degrees F.) is 500 degrees hotter than in a gasoline engine with a 7-to-1 compression ratio. The pressure (640 lb. to square inch) is more than four times that in the gasoline engine.

amount of air in the cylinders, and therefore the compression pressure, is constant. When you reduce throttle on a gasoline engine, you begin to starve the cylinders and drop the compression pressure. The fuel doesn't burn as well.

High compression—in the Mercedes-Benz, it's 19 to 1—improves the combustion. But the engineers have to be careful in boosting the compression ratio of a gasoline engine. Squeeze the fuelair charge too much, and it will ignite prematurely by itself. A Diesel engineer doesn't have to worry about that. As the piston comes up in the normal operating range, the cylinder contains nothing but air until the fuel is squirted in.

Open the throttle on a Diesel, and all that happens is that the fuel nozzles deliver more fuel-metered correctly to each cylinder. There's no spark, and the air supply arrives in each cylinder through its own inlet port. There's no pre-mixing of gas and air. Moreover, there is always more than enough oxygen present to burn the fuel delivered. And when you see a Diesel smoking, it's merely improperly adjusted.

Open the throttle on a gasoline engine, and the carburetor does a commendable but imprecise job of pre-mixing additional air and additional fuel at a ratio (by weight) of 15 to 1. Flowing into the intake manifold, this mixture alters in ratio as some of the gas comes out of suspension and is deposited on the walls. Seldom do any two cylinders get exactly the same-sized charge. Then ignition has to take place. That's complicated because automatic devices have to advance spark as the engine revs up.

[Continued on page 250]

## FACTS ON MERCEDES-BENZ DIESEL

Model: 170 DS 4-door sedan.

Engine: 4-cyl. overhead valve; 40 hp. at 3,200 r p m., compression ratio, 19 l, piston displacement, 107 8 cu. m., piston travel (in feet per car mile at 20 m.p.h.), 2,085; hore and stroke, 2.9" by 3.9", torque, 74 9 lb -ft at 2,000 r p m.

Weight: 2.810 lb, per hp, 70 lb. Transmission: 4-speed synchromesh,

rear-axle ratio, 4.1 I

Steering: 2h turns lock to lock, radius of turning circle, 18'.

Effective brake-lining area: 114 sq. in. Springs: coil, front and rear, independent wheel suspension, front and rear.

Outside dimensions: height, 63.39"; over-all length with bumpers and guards, 175.39"; width, 66.32"; wheelbase, 111.9"; overhang, front 23", rear 39.7"; tread, front 51.7", rear 53.5".

Incide dimensions: seat-cushion width, front 50.5" (total for split seat), rear 51", leg room, front 43", rear 28"; headroom, front 38.8", rear 38.4"; seat height, front 12", rear 15%"; vertical distance, steering wheel to seat cushion with seat in mid-position, 7.2"; front-seat adjustment, horizontal 9", vertical 0".

Tire size: 5.50 by 16.



## Masked Gunmen Test Rifles in Deep Freeze

THESE men are not re-enacting the great Brink's robbery. They are armorers coming out of a new U.S. Armed Forces climatic chamber at Springfield, Mass., where they have been firing rifles at 70 degrees below zero. The weird attire protects them against the intense cold

The test room behind them, resembling a huge walk-in refrigerator with walls a foot thick, is a hotbox as well as cold chamber. Its temperature can be varied from 85 degrees below zero to 175 above. In the higher temperature ranges, humidity is added to the air to simulate conditions in tropical jungles.

As various small arms are fired through open ports into armor-plated boxes filled with sand, still and motion pictures record the effects of extreme heat and cold on the weapons' action.

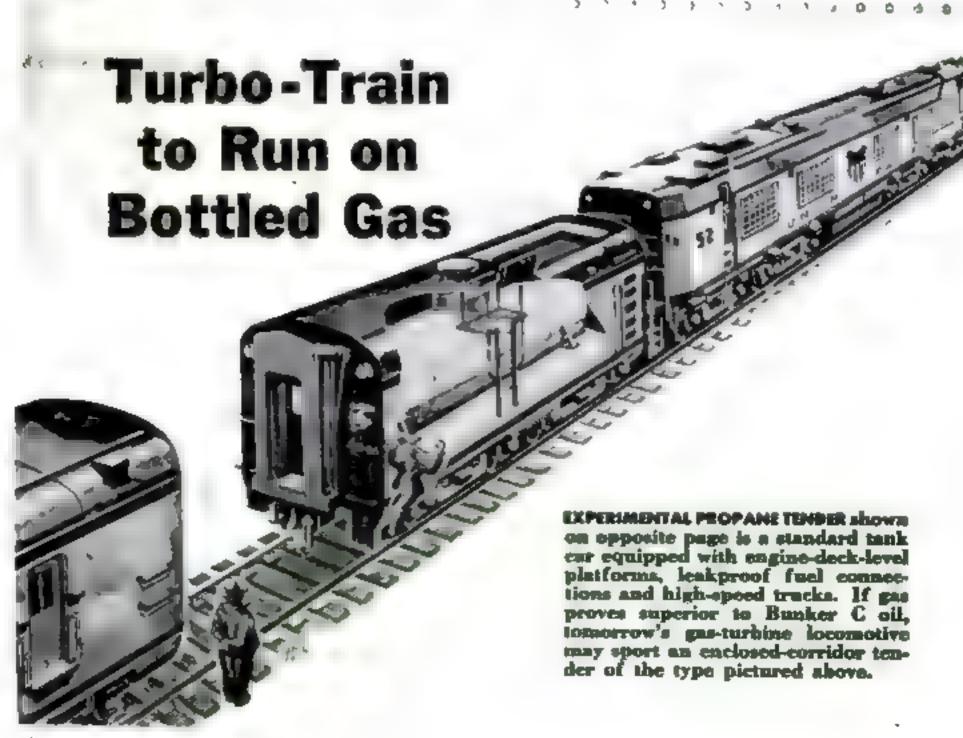


## ice Maker Crushes ice, Too

Riss molded into this plastic container are said to make ice chopping a chore that won't wreck the kitchen. After the water is frozen, you give the container a few whacks at strategic spots with a mallet and out flows crushed ice. The Pruett Novelty Works, Covina, Calif., makes the ice crusher.

## TV Briefs Pilots on Weather

Force pilots at Hamilton Field, Calif., won't have to wait for weather briefing. An up-to-the-minute weather map, telecast from central headquarters, gives them a picture of conditions aloft and the best route to fly to any destination.





## Supersonic French Jet Carries Engines on Wing Tips

First French plane to crash the some barrier in horizontal flight, the Trident, above, packs its jet engines in wing-up nacelles. The speedy interceptor also carries a rocket in the tail, to give it a very fast rate of climb. Once the rocket fuel is exhausted, the plane's light weight gives it a lower landing speed than that of any other modern fighter. Small and inexpensive base facilities will accommodate it, and the relatively simple design of the plane will make it possible to turn out large numbers of the stubby-winged fighting ships quickly and at low cost.

Seventy-two years ago a steam locomotive was built to run on gas generated from naphtha and water. The experiment flopped, partly because the novel fuel had a tendency to clog the flues, but mainly because Eric Railroad engine crews refused to ride with so dangerous a cargo.

Today, the possibility of burning a gaseous hydrocarbon—propane—in a gasturbine locomotive is being explored by the Union Pacific. Out of these experiments may come a brand-new kind of tender, tailored to meet the needs of tomorrow's super-lucomotive.

In its first test of propane, the Union Pacific will haul along a remodeled tank car of the type now widely used to transport bottled gas. Built to withstand a pressure of 300 pounds to the square inch, it will carry 11,000 gallons of propane. A leak-proof, flexible connection will deliver the fuel to the turbines in the locomotive. There the performance of the propane will be checked against that of Bunker C oil—the fuel now used in the U.P.'s gas turbines.

If propane proves easier on the rotor blades than heavy oil, U.P. technicans believe that the greater space needed to store it will be justified. Look, then, for more scientifically engineered propane tenders, designed to blend with streamlined locomotive units.—Henry B. Comstock.





Come for a dizzy spin in this tiny, fast and rugged acrobat on wheels. Its performance and antics amaze even its designer.

## By Joseph Hines

RESIDENTS along a road outside Wheatland, Pa., near the Ohio border, are getting popeyed watching the daily performance of a new car. Some of its tricks would make any sensible mule hesitate

The Mighty Mite is its name. The Marines are testing it as a quarter-ton transport vehicle for airborne assaults.

PSM photographer Bill Morris has covered about every type of new car, civilian and military, produced during the last 13 years. He saw the first demonstration of the original jeep in 1941. He doesn't excite easily.

Bill got his first look at the Mighty Mite outside the Mid-America Research Corporation's plant at Wheatland, Pa. Ben F. Gregory, veteran racing driver and inventor, and an advocate of frontwheel drive for more than 30 years, was boasting about the prowess of his baby. He designed the original model of the Mite.

"It's got four wheels and looks like a small jeep to me," said Bill, "What's so different about it?"

"Jump in, Mr. Morris," Gregory said, As the Mite started, I jumped back.

"Stay put," called out a mechanic.
"He'll clear us. The thing has a turning radius of only 12% feet."

A neat circle and the lightweight Wighty Mite was off toward the road.

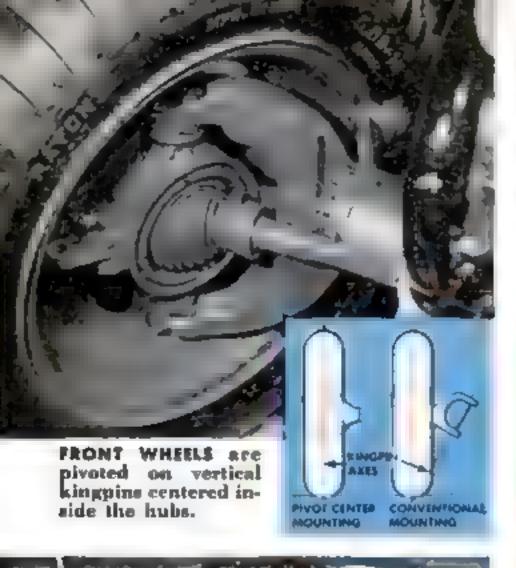
One of the Mite's many weight-saving devices is an air-cooled engine. Because it was available for the first experimental models, a four-cylinder, horizontally opposed German Porsche, developing 44 horsepower at 4 000 r.p.m. was used.

## Little Car Has Big Ideas



SPORTS CAR

JUNE 1953 89

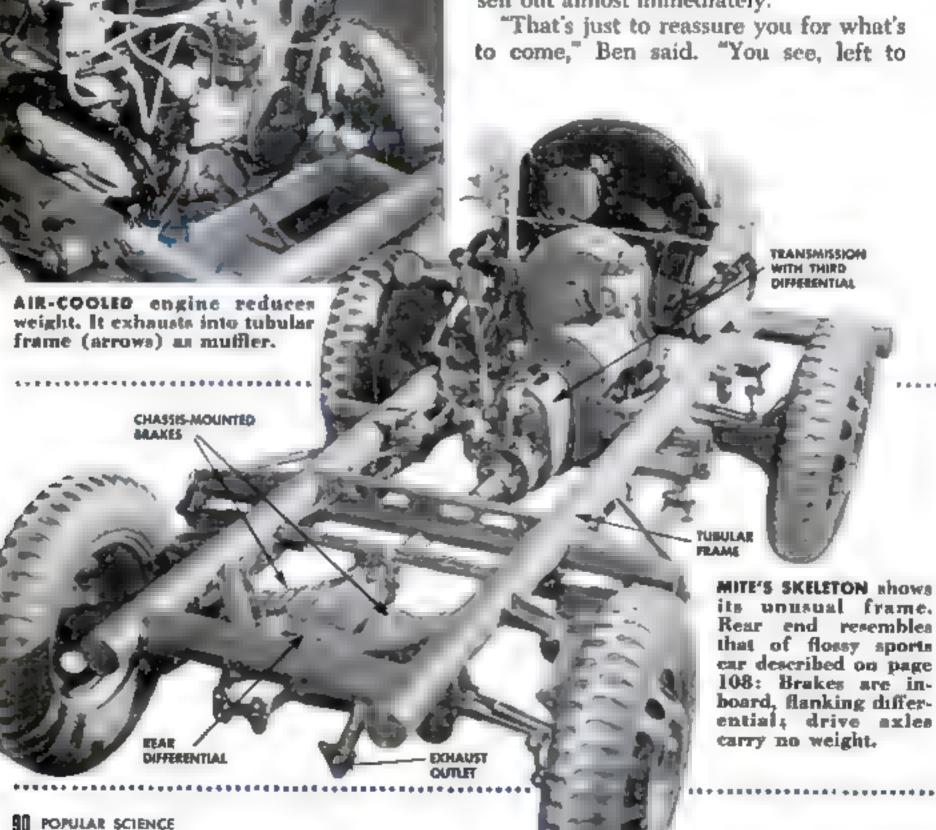


words came out, "Yes-yes it-it's different from a jeep. What a ride!"

Now it was my turn. We were doing better than 50 on smooth pavement when I saw double railroad tracks crossing the road ahead. Instead of slowing down, Gregory put on more speed. He told me to watch the steering wheel. I did. He had taken both hands off the wheel. I gripped a handle by the windshield. I didn't need to. The car didn't swerve or sway; the steering wheel didn't even wiggle. If I hadn't seen the tracks, I would have sworn that we were still on smooth pavement.

## More Tricks to Come

"Now watch this," he said. His hands were off the wheel again. With one finger he spun the wheel sharply to the right. I braced myself. The car turned slightly to the right, but straightened itself out almost immediately.





WHAT THE DRIVER SEES. For compact stacking in transport plane, car reduces to 45-

inch beight. Seats and windshield fold back, steering column lowers onto cushion.

themselves, those front wheels just want to go straight ahead."

Then the tricks came fast. Through king-size potholes, over a rough and rutted shoulder, then down into an eight-inch-deep drainage ditch between the road shoulder and a sharp climbing embankment. Up on the embankment and then straddling the ditch—all with one-finger steering. And over the roughest of it I felt none of the tail-bone shocks you get in a jeep

We approached a wide part of the road, Gregory slowed down, but we still made a U-turn at a good clip.

"That," he said, "was to show you that

the Mighty Mite has four-wheel drive at all times—even on sharp turns on smooth pavement."

"What's the gimmick?" I asked.

"A third differential, in the transmission, between the front and rear differentials," he explained. "It prevents wrap-up by compensating for the different distances the front and rear wheels have to travel in taking a curve."

Now there was a steep embankment on our right going down about 15 feet.

"That's an 85 percent grade," he said.
"We've measured it,"

Before I could ask why, I got the answer. We were going down it, slowly. At

## FACTS ON THE MIGHTY MITE

Model utility truck, %-ton lightweight, four-passenger (two on seats, two on rear fenders).

fugure cair-cooled, 4-cvl., 79 cu. in., horizontally opposed, overhead valve; 44 hp. at 4,000 r p.m.; twin carburetion.

Werght: 1,496 lb.; per hp. 34 lb.

transmission: three-speed forward in Hi-Lo range, with No-spin differential; positive four-wheel drive at all times.

Brakes four-wheel, chassis-mounted, conventional two-shoe hydraulic with built-in self-adjusting features; sealed against water and dirt

I lectrical system: 24-volt, I battery.

Radous of turning circle: 125'

\*pring-: cantilever leaf, front and rear; each wheel independently sprung and suspended.

Grand degrace 94"

Omicasions height 58"; over-all length, 96", width, 58", wheelbase, 64".

Adjustment 3" in steering column to suit size of driver

Body construction: front fenders, bood, cowl and side panels, 16-gauge aliminum sheet, cargo body and rear fenders, 20 gauge steel, rigidized for strength.

Tires 5.90 by 15, cross-country, 4-ply.



BUILT-IN BALANCE, fore and aft as well as side to side, enables Mighty Mite to run on any

three wheels. In an emergency, a wheel can be changed without using a jack.

the bottom he braked to a stop. The car was standing almost straight up on its nose.

"Let me see you get out of this," I challenged.

Gregory shifted into low speed, Lo range. (The Mighty Mite has three speeds forward, which, with Hi and Lo ranges, makes six.) There was a grinding of power. A slight shuddering and the front wheels pulled us out onto the level ground. We were off again.

Off again was right. This was the Mid-America's proving ground—a driving nightmare of trenches, ridges, humps, bumps, crisscross gullies and deep hog wallows. Up and down we went, leaping into the air, leaning over at fantastic angles. As we nosed down into a mudhole the right rear wheel shot up into the air. Next only the front left and the right rear wheel were touching ground.

## No-Spin Differential Does It

Gregory realized that these wheels-dangling-in-air antics puzzled me. "Only the wheels that have traction get power—all the power," he explained. "No-spin differential, you know."

Back at the plant, there came another believe-it-or-not demonstration. A me-

chanic removed the right rear wheel. The Mighty Mite didn't flop down on its wheelless hub. A driver got in and took off. Fast, slow, in tight circles, it didn't make any difference. The wheelless corner stayed up.

## Car's Performance Explained

The mystery of this performance was explained by Herbert A. Blenkle, chief engineer.

It is a matter of balance. The vehicle is designed so that its center of gravity is at the intersection of lines drawn diagonally from opposite wheels. Removing one wheel doesn't move the center of gravity enough to throw the car off balance.

There is also what Blenkle calls "pivot-center steering." Because the pivot, inside the hub, is directly in line with the wheel, as in a bicycle, the wheel always wants to go straight ahead. As in a bike, there is no twisting tendency when a wheel hits a bump. The result, as Blenkle explains it, is that the steering wheel doesn't have to fight the road. The scheme, he says, gives the feel of power steering without auxiliary power to do the work.

Independent suspension of each wheel



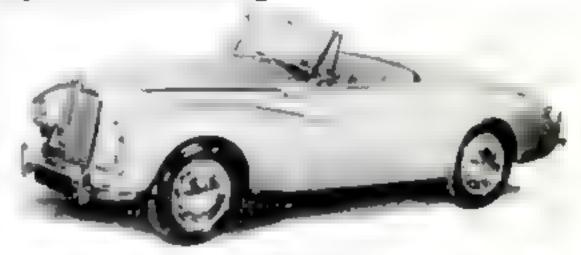
## Chrysler Builds Dream Sports Car on Modified Chassis

THE newest Chrysler "idea" car-"idea" means that you can't buy one-is the D'Elegance. A two-seater sports convertible, it has the FirePower V-8 engine and a New

Yorker chassis trimmed 10% inches to 115%. The body is Italian. The spare tire is hydrauheally lifted from a rear-deck well. Matched luggage is fitted behind the seat.

## Sunbeam's Alpine Car Strips for Road Racing

A 120-M.P.H. competition sports car, the Alpine, has been added to the English Sunbeam line. A two-seater, it can be stripped of top, windows, and hood louvers for racing. The four-cylinder 80-hp, engine displaces 138.2 cu. in. The Alpine costs \$2,999 in New York; specially tuned, about \$350 more.





## **Jaguar Converts Sports Racer to Slick Convertible**

THE Jaguar XK 120 is a 149-m.p.h hotshot in competition but a little on the windblown side as transportation. Now Jaguar has made a sister convertible by adding a

folding top and drop windows. It's said to make around 133 m.p.h., which ought to be fast enough for anyone just taking his girl for a spin. The car sells for \$4,250, N. Y.



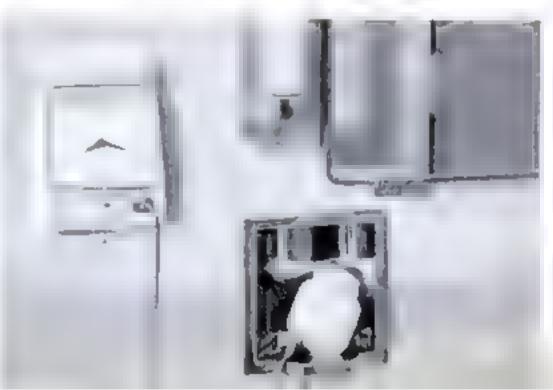
## **Hei**met Protects Ball Players

ALFRED GRUNNALD, rookie first baseman tor the Pittsburgh Pirates, is shown below bolding a plastic cap (right) which is buing used for the first time this year. Previously, a liner was inserted in the cloth cap (left) when a man went to bat

## Wall Clock Handles Three Jobs

Trus clock is a part of the house—it is built in over a standard four-inch wall box and carries two outlets for plugging in appliances (like the razor shown). A night light fits under the hood at the top of the clock. It's the Tel-m Wall, a GE Telechron





## Army Dogs Drop by Chute to Rescue Fliers

AFTER training for weeks on ropes strong across a ravine, the Alaskan huskies at left wait at the door of a moving plane to make their first jump. At right, they are in the air—full-fledged para-pups. A new type of war dog, they will work with the Air Transport Service, searching out downed fliers in maccessible areas.

Other huskies in the K-9 Corps haul sleds in Alaska. In Korea, Dobermans, giant schnauzers, shepherds and collies have served as sentries, scouts and messengers. One man and three dogs make a team for sentry work and guard duty in Japan and Germany. Sentry dogs can earn a diploma in only eight weeks at one of four training camps for "Wags."

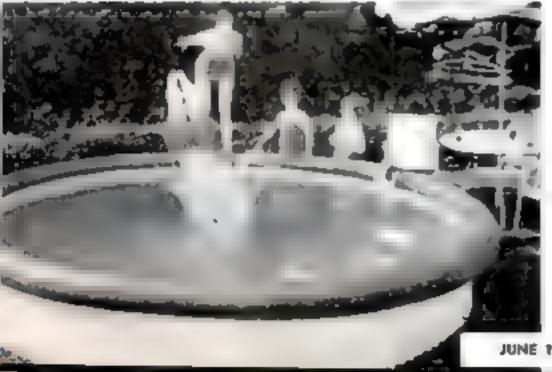


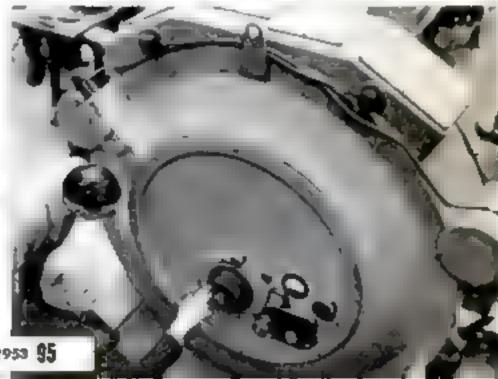
## Back-Yard Pool Costs \$100

A PLASTIC pool that sells for about \$100 moves the old swimmin' hole right into the back vard. Large enough for shallow diving, it is 12 feet in diameter and 24 inches deep when fitted over the rigid stand. Doughboy Industries, New Richmond, Wis., makes it.

## Camera Shoots 50,000 a Second

This high-speed, drum-type camera snaps 50,000 pictures on 10 feet of film every second. It holds the 35 mm, film stationary while the optical works spin. The British Admiralty's research lab developed it for use in scientific research.







## Can We Tame

Putting man-made sun fire to peaceful uses may become the greatest feat of atomic science.

## By Alden P. Armagnac

IN a darkened laboratory at the University of Lyon, France, experiments have been in progress that may shake the world.

Here two atomic scientists, J. Thibaud and D. Perrier, have been setting off tiny explosions in glass and plastic vessels about the size of a drinking tumbler. Heated to incandescence by the shock wave of an explosion, air or argon gas in the vessel momentarily becomes luminous. Cameras register its bright glow. For a fleeting instant, the experimenters estimate, the temperature within the vessel surpasses that of the sun's surface.

Though their apparatus is small, their aim is spectacular. What the experimenters are seeking, they have announced, is a safe and controllable way to touch off a thermonuclear atomic reaction—the awesome reaction of the hydrogen bomb! If they should succeed, it would mean that the H-bomb's power could be tamed and harnessed for peaceful uses.

Hitherto this has been thought impossible. A temperature of millions of degrees is generally held necessary to touch off the H-bomb's reaction, in which speeding cores of hydrogen atoms collide and fuse together, turning into helium and liberating enormous energy. The interior of the sun, which owes its

Mighty blast of A-bomb has been only way known to set off H-bomb's reaction.

S POPULAR SCIENCE

## the H-Bomb?

heat to a thermonuclear reaction, has such a temperature. To match it on earth, only one way has been known—exploding an A-bomb. So, whatever an H-reaction's scale, the havoe wrought by its A-bomb detonator has seemed to rule out any but military uses.

If a less violent "trigger" could be found, it would be a different story. For a thermonuclear reaction can be of any size whatever—large or small. At the opposite end of the scale from super-colossal explosions, it could yield "atomic firecrackers"!

Thus the way would be opened to put the H-reaction to work for the good of mankind—to raze unwanted mountains, dig great canals, and stoke mighty engines, instead of serving only in instruments of fiery death and ruin.

## H-Power Rumors Fly

Secret work toward this goal, as hushhush as that which seems to have produced a successful H-bomb, has been hinted before

Argentina's president announced in 1951 that "thermonuclear reactions," mysteriously produced in a Heumel Island pilot plant by Dr. Donald Richter, Austrian-born scientist, would yield atomic power for industry. Then, last year, news dispatches said the project had been abandoned and its 300 pilot-plant workers dismissed.

Whether Dr. Richter's claims belong with famous hoaxes of history, or a bona fide scheme met with unexpected tech-

Luminous glow of gas hit by shock wave may lead to a new and gentler way.



nical difficulties, may never be known.

Nearer home a Washington news agency, "Science Service," reported last summer that U. S. Atomic Energy Commission scientists were working on taming the H-bomb reaction for peaceful uses. On paper, it said, they believed they had found a gentle way to "trigger" it; laboratory trials were to follow. Discussions reportedly were going on, "both within the AEC and on Capitol Hill," as to when to make public this sensational development. To date, however, neither details nor any official confirmation of this report have been forthcoming.

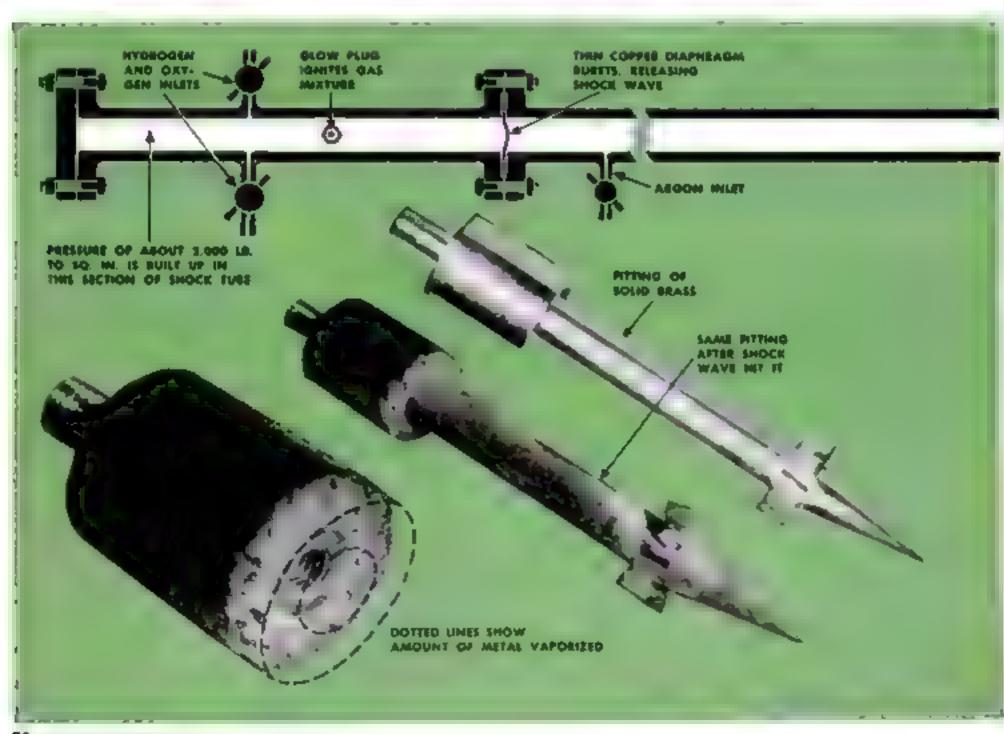
So any proposed "tame" way to touch off a thermonuclear reaction would remain a total mystery—but for a clue indirectly furnished by the AEC itself. Twice monthly it issues a digest of atomic-science articles from technical journals all over the world. Thus comes to light a little-known report by Thibaud and Perrier, written in French and printed

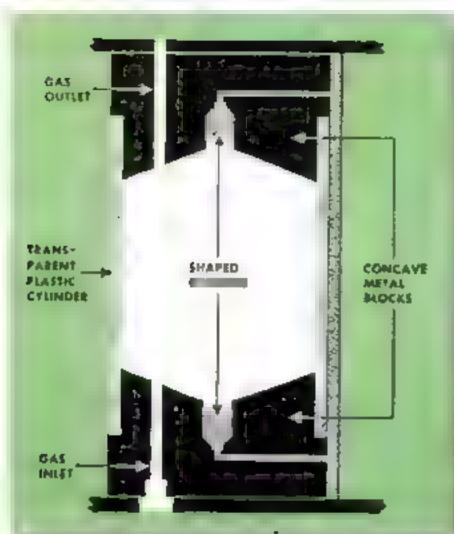
some time ago in the Italian physics journal Il Nuovo Cimento, telling of their remarkable tests with shock waves.

Scientists long have known, they point out first, that shock waves can make gases luminous. When earlier French experimenters set off pellets of flameless explosive, within a hole bored in a vertical brass cylinder, glowing plumes emerged and were photographed. (See drawing based on photo, on page 97.)

To make a gas incandescent, shock waves must raise it to an extremely high temperature—so Thibaud and Perrier were struck with the possibility of kindling an H-reaction with shock waves heat. Their experiments sought the most promising approach.

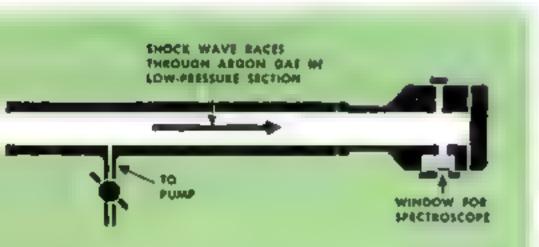
Explosive "shaped charges" like those of armor-piercing military rockets, but scaled down to half the size of a thimble, gave the best results. The experimenters obtained especially brilliant flashes of light when they aimed two or more





schemes to set off H-reaction are tested by midget shock-wave apparatus, one of several used by Thibaud and Perzier. Shaped charges face each other. Shock waves' collision gives temperature of tens of thousands of degrees.

BRILLIANT FLASH OF LIGHT occurs, as shock waves' collision momentarily makes argon gus incandescent. In this test, apparatus at left was placed horizontally, and camera aimed obliquely. (Photo from Il Nuovo Cimento.)



SHOCK-WAVE experiments in the U.S. are illustrated by this eight-hoot "shock tube" of steel, developed for guided-missile studies by Dr. Arthur Kantrowitz at Cornell. Admitting hydrogen gas from high-pressure evhider of exploding hydrogen-oxygen mixture bursts thin metal diaphragm. Shock wave races through tube (from left to right in diagram). Gas in tube becomes incandescent, and temperature above 32,000 degrees F. has been reached.

Before-and-after photos show what happened (in modified setup of apparatus) when shock wave hit brass piece. Heat evaporated quarter-inch of solid metal in about 1, 10,000th second. shaped charges at each other, so that the shock waves collided.

Temperatures attained were estimated to be of tens of thousands of degrees, hotter than any furnace in the world, and exceeding even the 10,700-degree temperature of the surface of the sun.

The experimenters propose two ways to go still higher and, perhaps, reach the fantastic temperature it takes to start an H-reaction. One is to use more and bigger shaped charges. The other is more novel. High-voltage electrodes would accelerate the dense clouds of ions, or charged particles, produced when the shock waves collide. Giving already-speeding particles this added kick should be equivalent to boosting their temperature.

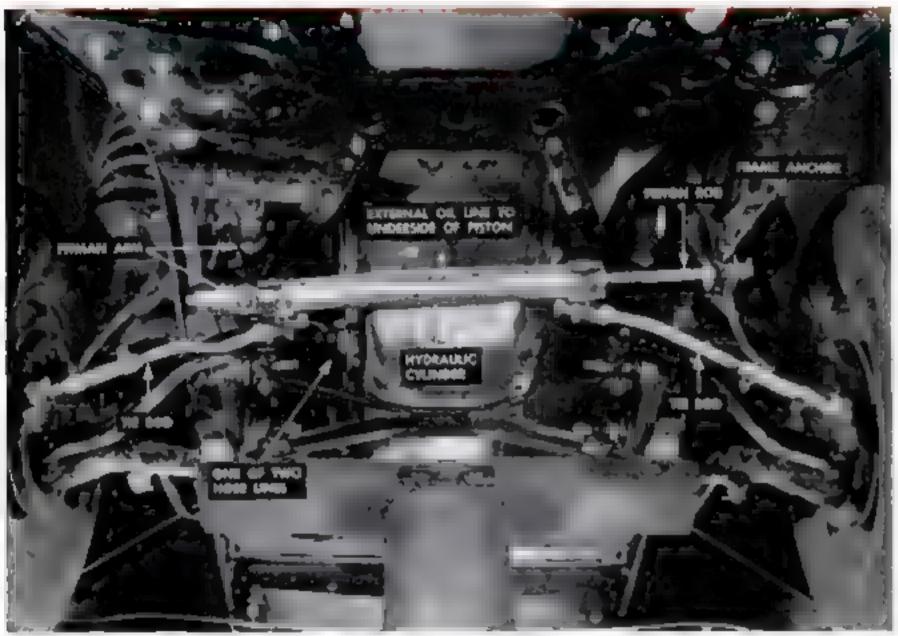
## N hat Goes On Here?

Are rumors of a U.S.-developed trigger for the H-bomb based upon similar experiments? While that must be speculation, here are facts:

Experiments with powerful shock waves have been under way at the AEC's

[Continued on page 252]

## New Power Steering Fits Old Cars



SIMPLE AS CAN BE, the Monroe power-steering unit is shown here on a 1953 Nash. The unit

was left unpainted, and the car's shock absorbers removed, for clarity's sake.

A POWER-STEERING unit recently put on the market can be installed eventually on any American car not older than a 1949 model.

Made by the Monroe Auto Equipment Co. of Monroe. Mich., the new unit is already being offered as optional equipment on new models by Nash, Willys and Kaiser. In the form of kits to be installed in about half a day by garage mechanics, it is available at present for 1949-53 Ford, Mercury, Buick, Cadillac, Oldsmobile and Packard cars, as well as for trucks and tractors.

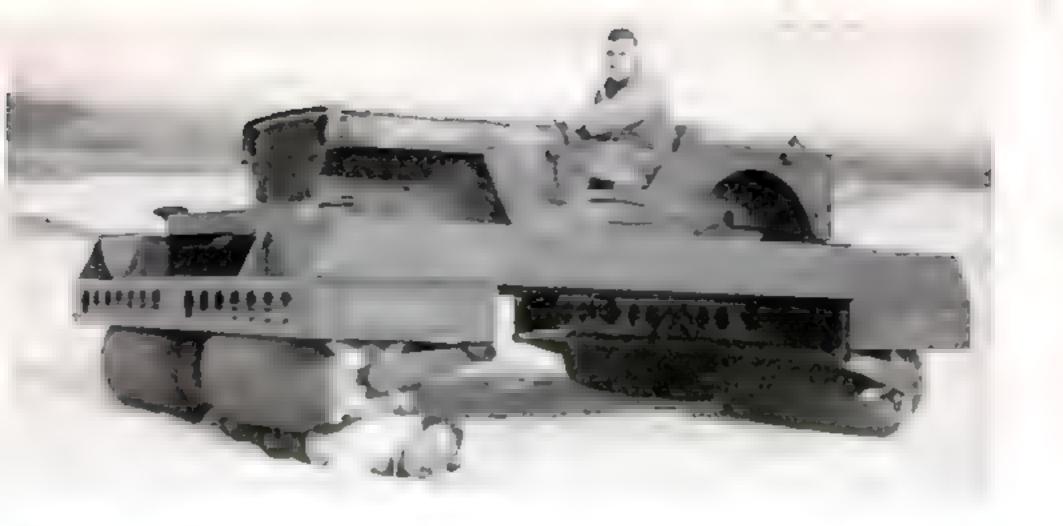
Those kits cost from \$225 to \$250, and the average installation charge is around \$25. Car owners are advised not to try to install the power-steering unit themselves unless they're set up to do a little welding.

The Monroe power-steering unit is a single tube containing the hydraulic cylinder and valve assembly. The tube is connected to the Pitman arm and to the two tie rods.

In a typical installation, shown above, the piston is anchored to the car's frame on the right-hand side. Accordingly, the power-steering unit takes the place of the drag link in a conventional steering system. If the engine stops or the hydrauhe system leaks, says Monroe, the worst that can happen to the car's steering is that it will revert to normal

Two hoses carry oil from an engine-driven pump to and from the valve of the powersteering unit. One metal line carries oil to and from the underside of the piston.

The Pitman arm actuates the valve, and the unit can be adjusted so that as little as two pounds' manual pressure on the steering wheel, or as much as six or seven, will trigger the power boost. The driver has the feel of the road in his fingertips at all times, yet the hydraulic cushion provided by the power-steering unit eliminates most road shock.—Wesley S. Griswold.



## "Watermelon Tire" Runs Over Its Inventor, Leaves Him Grinning

Huge, baggy tires on this specially mounted Jeep pack so little air that they "swallow up" obstacles instead of flattening them as shown by inventor William Albee (under a tire above). He says they will give vehicles better maneuverability over sand and swamp. Rollers on vehicle's undercarriage drive the tires, axles merely hold them in position. The Rolligon, molded by Goodyear, is now undergoing tests.

## GI Designs His Own Dream Car: It Has Nine Rear Lights

M. Scr. Louis W. Struna, who designed this car himself, calls it four cars in one. The hood suggests an Alfa Romeo, the trunk is like that of GM's "dream car," Le Sabre; the headlight design was lifted from a comic book, and the engine came from a '49 Lincoln. There are nine rear lights—two tail lights, a turning light and a back-up light in each fender fin; a stop light at center. It was built at the Spohn works in Germany.



# Gears and Bearings Now Made by the Yard

BEONZE

COOLED

WHITE HOT from furnaces, molten bronze flows downward through water-cooled graphite dies. Out come solidified rods, tubes and other shapes of castings—by the yard.

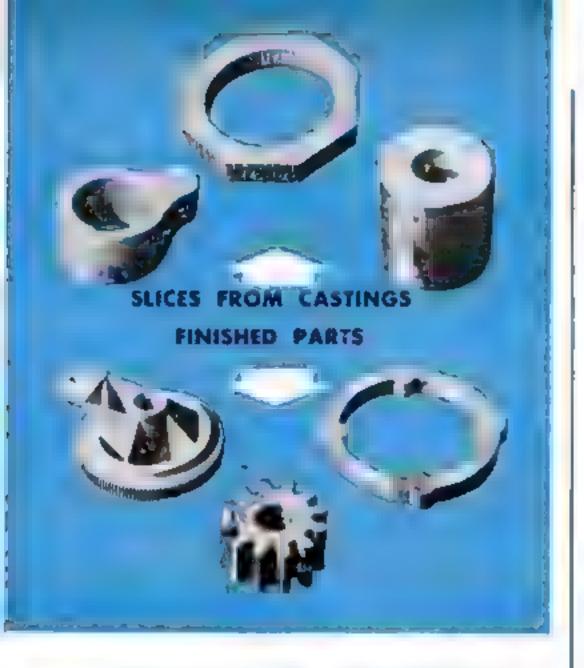
Buvers slice the rods and tubes like salami, then machine the slices into gears, bushings, valve guides and roller-bearing cages. The finished parts go into leading makes of food mixers, airplane engines, weighing machines, water meters and all kinds of industrial machinery.

Only a minimum of machining is needed. Each ready-to-shee length already has a cross section of exactly the desired shape, accurate to within a few thousandths of an inch.

These are the highlights of a patented method of producing tailor-made bronze lengths, based on a modern technique called continuous casting, that has been developed by the American Smelting and Refining Company. Recently it was demonstrated in action at a Barber, N. J., plant where half a dozen vertical production lines, each four stories high, make a total of 1,000,000 pounds of eastings monthly.

Sux furnaces empty liquefied alloy by

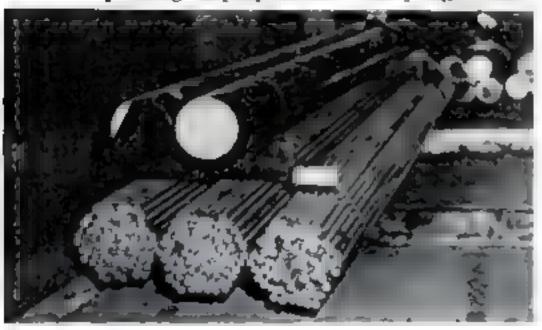
NUMBERED VIEWS show successive steps of continuous-casting process for bronze. As a casting is made, it descends along one of six verteral production lines, each four stories high.



gravity into six dies. These determine the shape and thickness of castings, which may range from more than five-inch diameter down to curtain-rod slenderness. A die for small rods makes several at once.

Solidifying and emerging at the bottom of a die, a casting constantly grows in length. It passes between power-driven rollers, whose controlled speed governs its rate of descent. Finally an operator cuts off a desired length, up to 20 feet, with a swinging saw. The severed piece drops into a funnel-mouthed cutcher, a tube that tilts to deposit it horizontally upon a roller-topped handling table.—Alden P. Armagnac.

BRONZE CASTINGS range in size from half-inch rods to massive 5 4,-inch bars. Color of metal is silvery, golden, or typical bronze, depending on proportions of alloy ingredients.





## Vest Keeps Batteries Warm

Even see a battery walking? Well, here's one—an electric vest. Its 117 pockets hold tiny interwired cells. Worn under an overcoat, the battery will be kept warm to power a walkie-talkie in subzero cold that would weaken the ordinary battery. Goodrich makes it for the Signal Corps.



## Navy Tests New Missile

The Navy's new Regulus, shown belching exhaust smoke to a ship's deck, can also be fired from a platform carried pickaback on a submarine. The 30-foot, pet-powered guided missile resembles a swept-wing jet fighter in appearance.

## What Airliner Are You Boarding?

If YOU are a veteran air traveler you probably have boarded and flown in most of these planes. They are the principal types in use by the U.S. airlines today. Even if you are a groundling you no doubt have seen them being passenger-loaded on a Sunday afternoon visit to the airport.

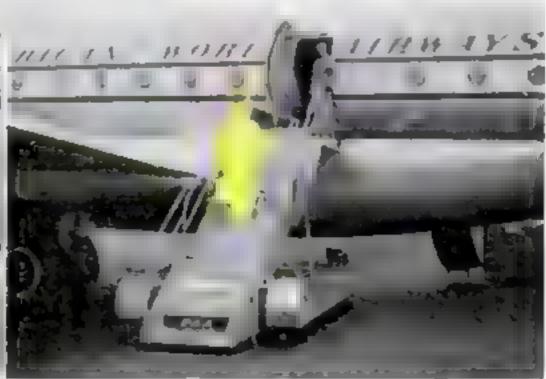
The trick is to identify the planes from these views, limited pretty much to the doorways. Here are a few pointers: Are the windows square or round? Are there windows both fore and aft of the doorway? Is the doorway in the nose of the plane, in the middle or at the rear? Is the loading ramp built into the plane or the type that is rolled up to the plane? Don't try to guess by the name of the airline, for most of them use several types of planes.

This is a tough one, but that's all for hints. Now, under each photo write the type of plane you think it shows. Then turn to page 278 for the answers.





sir four











## Midget Player Runs 50 Seconds

Drawing its power from two flashight batteries, this tiny record player spins 8%-inch disks. It's made for use in store displays. Each record delivers a 50-second sales pitch per side. Noma Lites, Inc., originally designed the tiny phonograph for use in talking toys.



## Traffic Snarl Solved by Model

The suspension bridge above is part of a model city built by a German engineer for working out traffic problems. Streets and tracks spread out over 130 square yards—about half the area of a tennis court. All construction, including trains, streetcars and autos is done to scale, just 1/25 the size of the real thing.



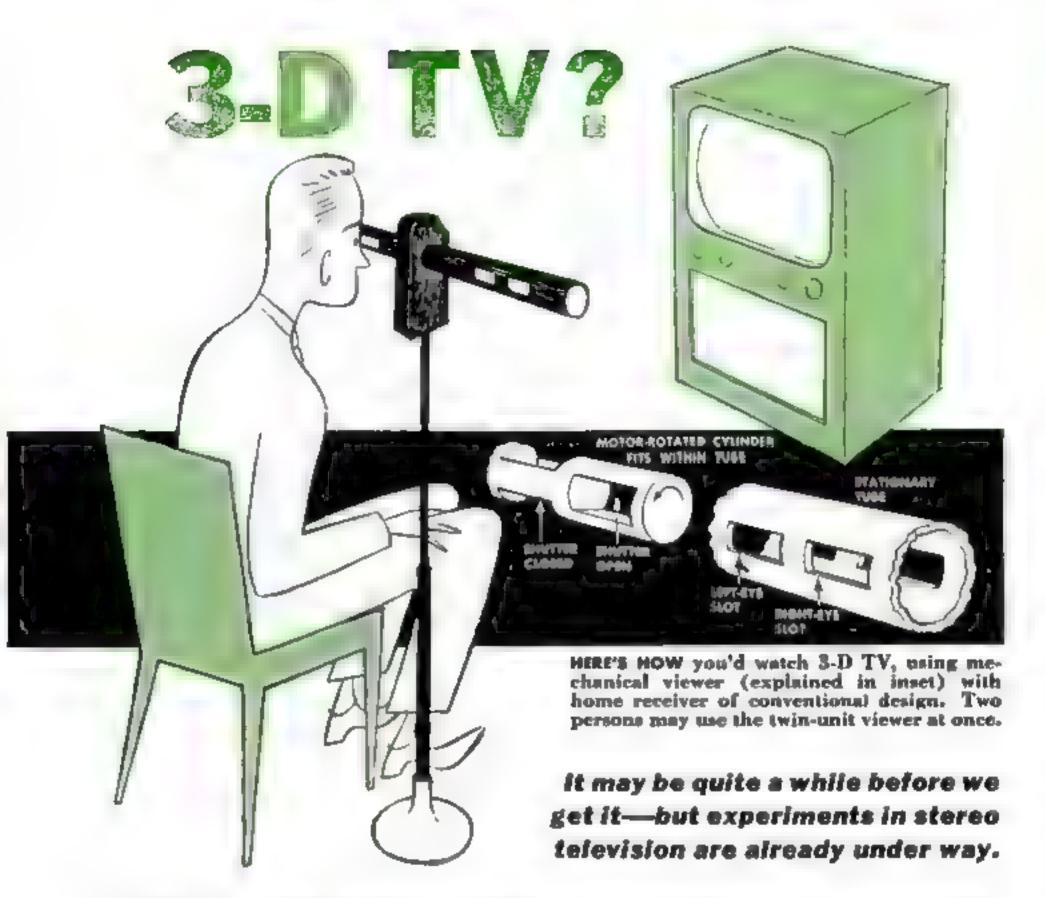
## Movie Shown Inside Big Pipe

Workmen above are watching a safety film in a huge siphon. Part of a network of irrigation canals under way in the state of Washington, the pipe was pressed into use as an impromptu theater because there was no building in the area large enough to hold the audience.



## Tricycle Helps Teach Art

This boy on this tricycle is not going anywhere: he's learning to appreciate art. The setup is an audience-participation device concocted by New York's Museum of Modern Art. When the trike is pedaled, figures in the window revolve to create abstract designs suggesting airplanes, fish and boats.



WILL TV match the movies' counterattraction, 3-D films, and come up with stereo pictures too?

One television pioneer, Ulysses A. Sanabria, is currently demonstrating in Chicago what may be the forerunner of 3-D TV. His hand-built outfit, whose pictures flicker like old-time movies, leaves many



PERISCOPE with oblique mirrors gives humaneyes' viewpoint to lenses of two esmerss, side by side, that televise a 3-D scene. Their pictures are transmitted alternately.

problems to be ironed out. But it works entertainers do seem to step out of the screen and perform right before you.

To televise a scene in 3-D, two TV cameras peer through a horizontal periscope giving them a double perspective like human vision. An electronic switch alternately transmits what each camera sees. The result is a succession of left-eye and right-eye pictures, 15 of each per second.

You watch a standard home-type TV receiver through a viewing tube with eye slots. A revolving shutter, synchronized with the transmitter, uncovers the screen to your left eye and right eye in turn. Thus each eye sees the picture intended for it.

Using a mechanical viewer, whose principle dates back to 1850, sidesteps the formidable problems of adapting a home receiver to such 3-D viewing devices as either Polaroid or two-color spectacles. The latter would be unsuited, too, to color TV.



## New Queen

\$29,200 car from Spain,

By Frank Rowsome Jr.

IF THAT spare \$29,200 in the teapot on the mantel is getting to be a nuisance, consider the benefits of buying a de luxe Pegaso. It will certainly:

• Pop the eyes of the neighbors. The Pegaso is about as effective an attention-getting device as wearing a tixedo while mowing the lawn. Park it on a city street and the sidewalk will clot with people; park it in a village and every small boy within 300 yards will be magnetically drawn; park it in front of your home and the Treasury will re-examine your tax returns. Even the troopers who fill out your speeding tickets will be fascinated.

· Pop your own eyes. If getting away

first from the light is your vice, the Caddies, 88s and Jags that have been dusting you will learn how it feels. A supercharged Pegaso will handily hit 60 about 5.9 to six seconds after the light goes green. This is a comfortable second or two better than some highly coveted sports cars, and a round dozen faster than most Detroit brands. It will keep right on accelerating, too-way past the point around 120 miles an hour when you quick-shift into high. So sassy is the getaway, in fact, that the first times you belt the gas there's a problem in keeping your head from rolling back into the luggage deck, where it isn't very useful.

What's remarkable is that this Spanish sports car doesn't get its bullet-like performance purely by pouring on the



BUBBLE BACK gives fine rear vision. The plastic dome slides back and swings up, revealing

spare tire and some luggage space. But like most sports cars, two passengers fill her up.

## Dazzles the Motor World

loaded with sass, style, and temperament,

makes a Jag look like a jeep.

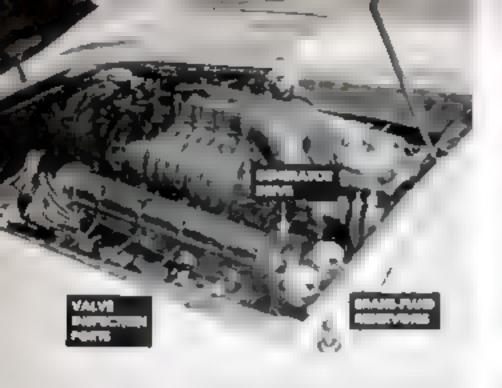
horses. Measured in displacement, its 170.8 cubic-inch (2.8 liter) power plant is only about half the size of that in a big Chrysler or Cadillac. Pegaso gets its snap (and its spectacular road-keeping) from luxurious engine and chassis design.

A designer's engine. The 90° V-8 that powers Peggy clearly shows a spare-no-expense approach. It is an "over-square" engine, with a 3.144-inch bore by a 2.751-inch stroke. Gear-driven from the front of the block are four overhead camshafts.

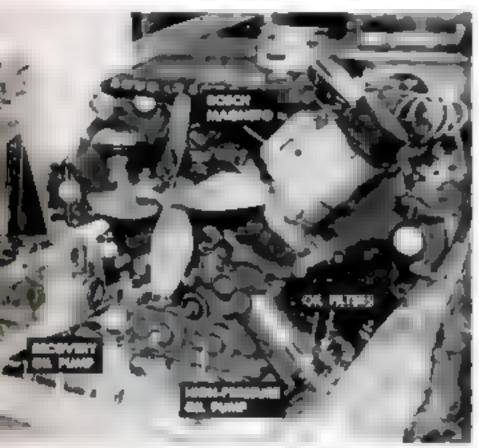
fitted with high-lift cams and six bearings apiece. Big sodium-cooled valves, as handsomely finished as jewelry, are inclined into the hemispherical combustion chambers. The five-ring pistons can be had in nine different compression ratios up to 9 to 1, with 8- or 8.8-to-1 ratios favored among U.S.-imported models.

Since oil may run hot in a high-performance V-8 (crankcase cooling areas being comparatively small), Peggy is fitted with an elaborate 12.67-quart lubri-





ROOTS BLOWER nestles in the engine's V. Taking in air through a scoop, it packs charge in with rotors turning at crankshaft speed. Fugure has some brightwork and spot-turning, but is mostly a wrinkle finish.



GEAR-DRIVEN FAN, cast of light alloy, is machined all over. Irregular blade spacing minimizes resonance. Actual engines are almost as slick as this display cutaway. Magneto can be adjusted without knackle-skinning.

FOUR-FOT VERSION is quieter than blown engive, gives practically identical performance up to about 135 map.h. These Weber carbs are duals, so engine has equivalent of one carb per cylinder. Ducted bood rams are in-



cation system. One pump snatches oil from the dry sump under the crankshaft and sends it to an oil cooler located directly beneath the radiator. From here a separate high-pressure pump withdraws cooled oil, forces it through a pair of disk-type filters connected in parallel, and shoots it, at differentially adjustable pressures, to the five main bearings and the four camshafts.

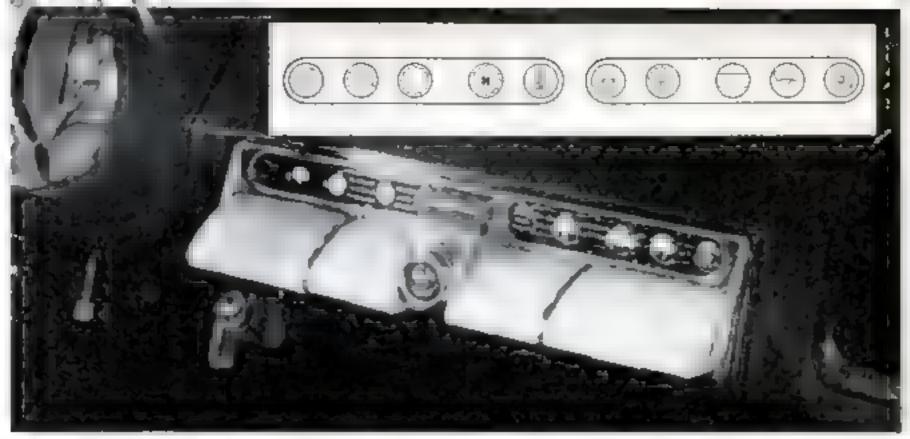
Lush touches. As befits a de luxe mill, this V-8 is slick inside and out. Cylinder heads, sump, clutch housing and the main block itself are all cast of high-strength light alloy. Buried parts that most owners will never see are finished all over to a showcase polish. (This isn't pure swank, of course; it aids quality control and permits closer tolerances.)

Similar drafting-table lavishness also marks Peggy's cooling, ignition and fuel systems. There's a big radiator and a 22.17-quart water supply (Spain is hot and hilly). An intricate gallery of internal tubes leads water to the wet cylinder liners and the valves. Ignition is optionally 12-volt coil or Bosch magneto, the latter favored for competition cars. With an electric fuel pump acting as a booster, a mechanical pump powered by the right intake camshaft takes gasoline—preferably 80-octane or better—from the dual fuel tanks.

In the pot department a buyer can take his pick of 1) a single downdraft Weber that draws air through the ducted alligator hood, 2) four downdraft Webers, also duct-fed, or 3) a big Roots-type supercharger. This charming gadget, which will bite you for an additional \$1,800, lets the engine peak above 6,500 r.p.m. and delivers flat-out speeds above 170 m p.h. (If it is true, as Aldous Huxley claims, that speed is the only new sin invented in this century, Peggy is uncommonly sinful.)

How many horses? Considering that they named the car after the ancients' best-known horse, Pegaso's manufacturers are oddly skittish about horsepower claims. This is perhaps partly because of all the options. With two slightly different engine sizes (152.5 cu, in, as well as

IIB POPULAR SCIENCE



CONSOLE has 10 switches marked with symbols for owners who can't read Spanish. From left: starter; city beam; country beam; fog.

panel, interior lights; switch that changes horn to headlight flasher; heater; wipers; parking lights. There's also a foot dip-switch.

170 8), nine compression ratios, two ignition systems, three carburetor options, and fuels ranging from 72-octane pump gas to methanol blends, there are dozens of possible combinations.

There's undoubtedly another reason for the lack of an official factory rating. Señor Wilfredo Ricart, Peggy's principal designer and the boss of the factory (Empresa Nacional de Autocamiones) is reportedly eager to avoid the competitive power claims that currently beset some U. S. makers. Entering the super-sportscar ranks of Ferrari, Cunningham, Mercedes, and Bentley Continental, ENASA as a newcomer to the field evidently prefers to avoid a horsepower war.

Power estimates, however, aren't lacking. The smaller engine, unsouped and with one carburetor, is believed to deliver about 140 hp. at 6,100 r.p.m. The larger version, with four carbs and a Bosch magneto, is pegged at about 170 to 190 hp., and the blower-equipped jobs are reputed to put out well over 200 hp. at 6,500 revs.

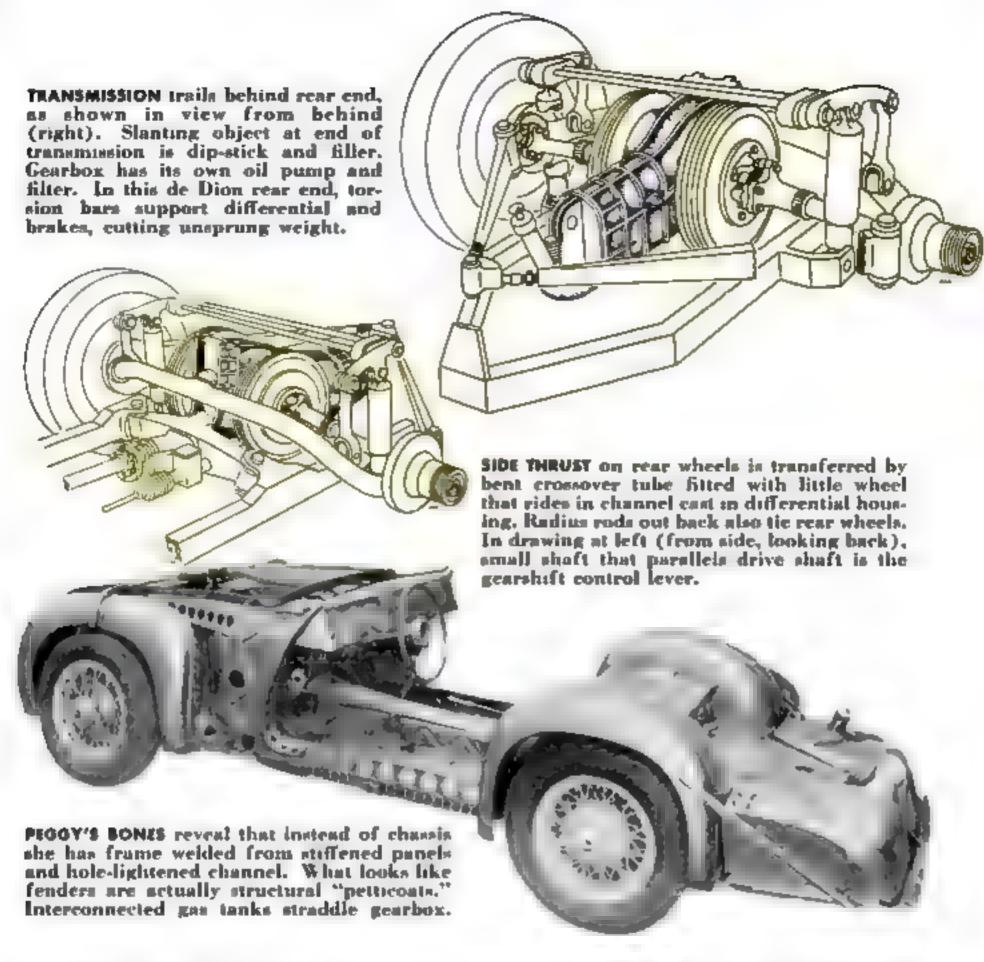
Rear end. The drive system by which these horses get to work is also elegant. There's a single-disk dry clutch just astern of the flywheel, followed by a long snout on the clutch housing to reduce the length of the open propeller shaft. From this shaft the power train then unconventionally ducks past the differential to a five-speed transmission located out in back. (Which explains why Peggy has

er passes forward to the differential and aside to each wheel. In this modified de Dion rear end, unsprung weight is close to a minimum and there's no bulge to the rear elevation. Seen on the road from behind (which is where you'll mainly see it from), Peggy has a flat-bottomed rear.

Transmission. It appears to be a mistake to shift gears on a Pegaso with cautious delicacy. Not that you can't, the gearbox is synchronized in the upper four of its five speeds. But the little slices of a second used up by careful shifting needn't be spent—you can just haul off and fetch the shift lever a stinging wallop. A driver who feels real uppity can even upshift or downshift without bothering with the clutch. A sensitive accelerator foot, immense assurance, and a stiff right cross to the shift lever do the trick. If your assurance doesn't falter, she won't spit gear teeth back at you.

Brakes, front end, steering. Two transparent reservoirs on the fire wall feed reserve brake fluid to the master cylinder. Peggy has two entirely separate braking systems, one each for the front and rear wheels. An unusually large lining area (190 sq. in.) is provided to prevent brake fade. Since the rear brakes, being inboard, are shielded from the regular air flow, two scoops beneath shoot up cooling air around the finned drums.

The front suspension uses radius arms and torsion-bar springing. The telescop-



ing shocks are of ENASA's own design and seem to be a big factor in the car's rail-like road-keeping. The steering gear, also the company's own, uses a vertical gearbox from which the link runs straight forward. Its ratio is abnormally "fast"—you move the wheel only 1.7 turns from full left to full right. (This isn't obtained by limiting wheel swing, either, since the car has a 31-foot turning circle.) Though applauded by many racing drivers, such fast steering gives Peggy a nerve-wracking responsiveness.

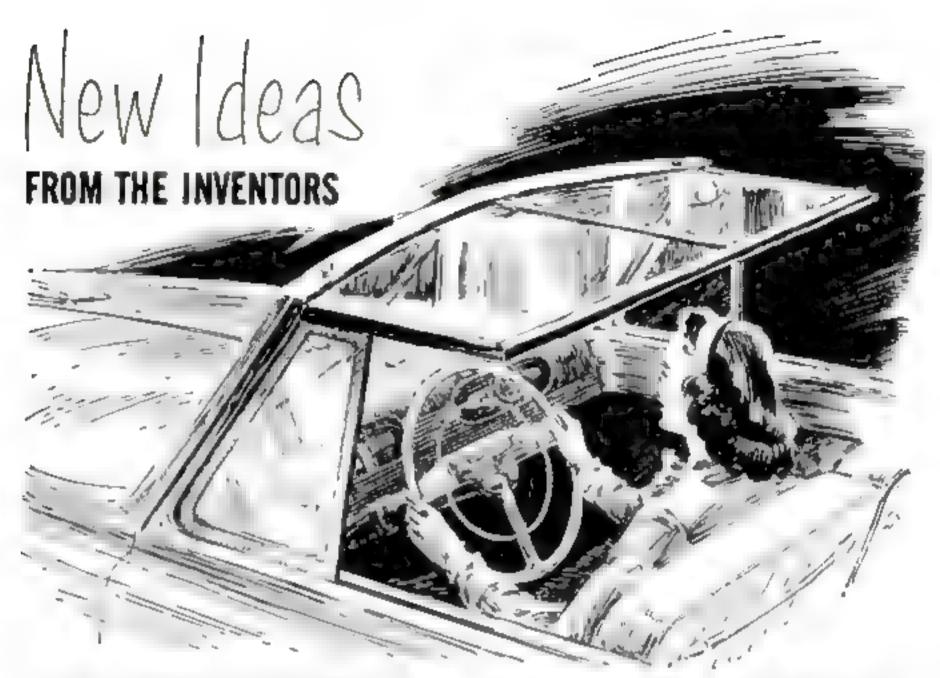
Peggy weighs 1,950 pounds without the thin aluminum body; curb weight runs from 2,150 to 2,350 pounds. This is roughly half a ton less than a Chevvy.

She is deceptively small. The wheelbase is almost two feet shorter than a current Ford's, and the height, depending on what body is fitted, comes about to your shirt pocket. But there's 6.3 inches of road clearance

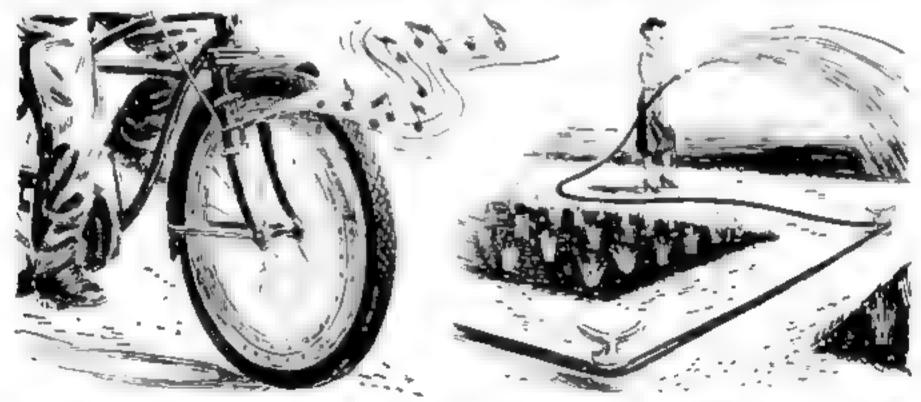
Despite the horses under the hood, fuel mileage is quite good. Señor Ricart, Peggy's papa, reports 26 miles per gallon at a 70-m p.h. average on hilly Spanish roads. Although this was in a one-carb car, it indicates that the hotter versions won't be gas-hogs by U. S. standards. It also suggests the warming thought that, having laid out \$20,000 or \$30,000 for a Peggy, you can save at the pumps.

How much, really? The supercharged job shown here is tagged at \$29,200, delivered in the U. S. It is, however, obviously "loaded." Brewster Motors of

[Continued on page 256]

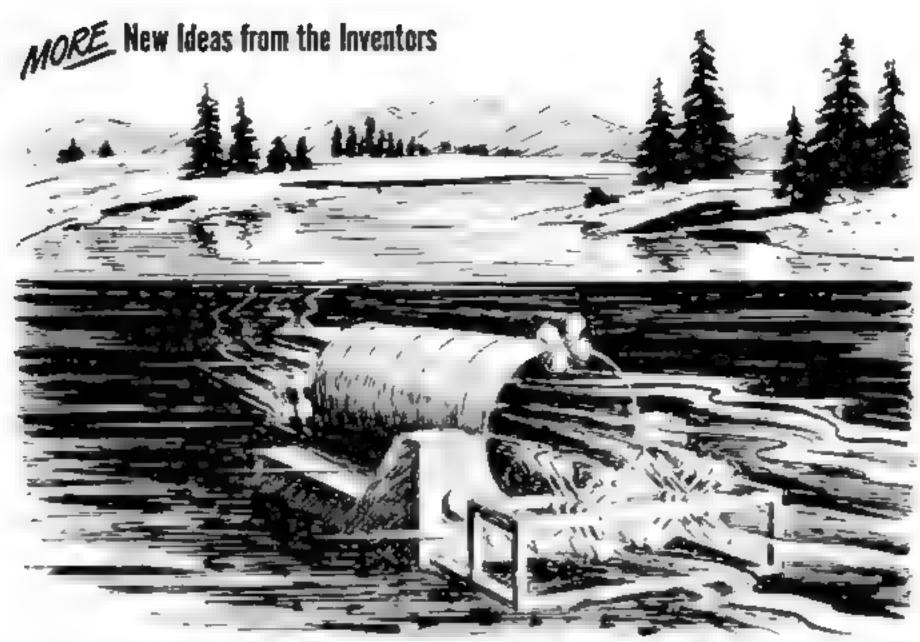


1 Hood to Stop Open-Car Drafts. Keeping your hat on-or your hands in placein a convertible would be easier if the car had an overhead windshield like this recently patented one. It would be bolted to the regular windshield and could be raised, lowered or tilted to suit the passengers and the weather. It would not interfere with the top. When covered by the top, the windshield would serve as an overhead map shelf.



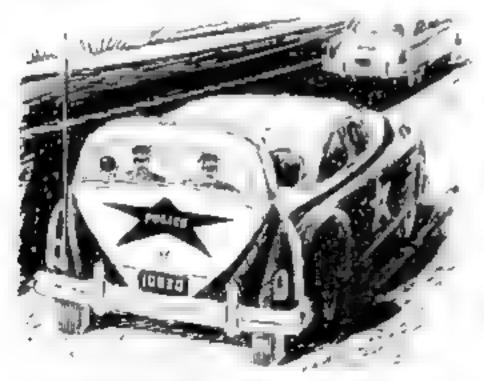
2 Bike to Sing to Rider. A grooved metal record attached to any standard bicycle wheel would help a cyclist while away the miles. A playback stylus hooked to the front wheel fork would follow the record groove. The recording would be audible to the rider and might also serve as a signal to nearby pedestrians.

3 Hose Guide to Protect Plants. The garden hose could not damage your fragile plants if you snaked it around the flower-bed margins with these removable roller guides. A long pointed spike and a convenient handle on each guide would make it easy for you to sink it into the ground or pull it up quickly



4 Machine to Mine Ore Under Water. Placed on a river bed, this tube would strain ores and precious stones out of the flowing water. The inventor claims that a proper combination of stirrers, sifters and

washing machines could collect river sediment and separate heavy metals and gems from lighter sand, soil and stones. Valuable ores would be deposited in the lower chamber, the rest passed back into the river.



Dummy Car to Slow Speeders. A movable roadside sign made to look like the back of a police car might discourage speeding and reckless driving. Speeders who were wise to the trick would have to slow down anyway because the billboard could conceal a real police car.



6 Handle to Hold Paint Can and Brush. This holder would solve two standard painting problems: how to pick up the can and where to put down the brush. You would loop the flexible strap around the can and snap the two handle halves together to form a can holder and brush clip.

U. S. patents on these inventions have been granted to: 1. James L. Matheny and Richard H. Perkint, Santa Ana, Calif.; 1. Robert E. Mueller, NYC; 3. Martist B. Austin Ir., Deerfield, 19.; 4. William T. Vogelpoul, Surabaya, N. E.I.; 5. William Taylor, John Worsham and John Davis, Oakland, Calif.; 6. Eduard Decker, NYC.



## Anymody Can Build a House

With cash and on-the-job advice, a Cleveland bank helped more than 300 amateurs build homes.

#### By Wesley S. Griswold

THANKSGIVING DAY, 1951, was a bad day for Cleveland, and especially for Louis Vash, who was building his own home. One of the heaviest early snowfalls in local history paralyzed the city. It threatened to squash Vash's unfinished house. The roof, which he had shingled a few days earlier, settled under the weight of the wet snow and pushed one of the living-room walls three-quarters of an inch out of line.

Vash desperately called for help—not from friends, family or the fire department, but from a bank. It was the bank that was financing his building program. You might think that this was about as sensible as notifying the corner drugstore of a flat on your car. But the vice-president of this bank—big, bluff Oscar A. Maeder—was once a bricklayer. He has spent most of his life supervising construction, and he came a-running.

Vash, meanwhile, excitedly climbed onto the roof and began rolling big snow-

ONCE A SRICKLAYER, then an electrician, Roy Rouzer of Mayfield Heights, Ohio, had never tried carpentry until he built his own house. He hired a carpenter for just one day.

balls off. By the time Maeder got there, the roof was nearly clear. "I think I ought to fasten a cable to the wall that's leaning, and to the straight wall opposite," he told his rescuer. "Then put a turnbuckle in the middle and haul in the bulging wall with that."

"Okay," said Maeder. "But do you know why this happened?"

Vash didn't.

"Well, for one thing, your roof isn't properly braced," Maeder explained. "And, look there—that double plate, just where the frame of the kitchen meets the frame of the living room. You hardly lapped those two-by-fours at all. They tie the front and rear of the house together, man. Why, you've practically got an open joint there!"

#### Offers Remedy

Maeder showed Vash how and where to brace the roof and how to put strength in the weakened partition by making a new double plate, amply lapped. Then he hurried on to deal with other people's emergencies.

The bank he serves is Cleveland's Second Federal Savings and Loan Association, which is an interesting institution. It makes a good many of the usual kind of construction loans, but for the last three years, it has also been lending money for housebuilding on a new and unusual basis, C. W. Grove, a hearty, dynamic ex-contractor who founded the Second Federal with a little more than \$7,000 in 1934 and has guided it so successfully that it now has assets of more than \$40,000,000, believes that almost anybody can build a house. Anybody, that is, who has a deep desire to do so, perhaps a little know-how, a willinguess to learn—and expert coaching.

#### Bank Provides Couches

The Second Federal backs Grove's belief in amateur homebuilders with cash—not in a lump sum but as the bills come in—and provides the coaches: trouble-shooting Oscar Maeder and a younger man, Robert F. Derry, an assistant vice-president who is a trained archi-



NEAT AND NIFTY is the house of apprentice patternmaker Charles Nord. It was finished in a record time of 10 months with the help of his father. Wife came in handy, too.

tect. They regularly inspect the houses going up, give seasoned advice, and

anticipate trouble if possible.

Since March, 1950, more than 300 residents of Greater Cleveland have got the Second Federal's approval to go ahead and start building at the bank's expense. They have included such unlikely homebuilders as a bass-fiddle player, an airline pilot, a tailor, a typesetter, a fireman, a bartender, a salesman of television sets, a truck driver, a pressman, an ad-agency employee and the supervisor of a tabulating-machine unit in a factory.

And the houses they have built cost them at least a third less than if they had

hired the work done.

Maeder, who does most of the inspecting and supervising of owner-built houses for the bank, has hardly any more freedom than a doctor. Inexperienced bricklayers, masons, carpenters and plumbers don't besitate to telephone him with their problems at any hour.

THIS TRUCK DRIVER, L. J. Thomas, of a Cleveland suburb, helped two neighbors build their homes. He learned enough that way to buildhis own, and they repaid his help.





No owner-builder in the bank's records has put up a house singlehanded. The bank won't let any amateur do plastering, for instance. That must be done by professionals, and when skilled help is needed for the more specialized jobs, the bank insists that union labor be hired.

THE FIRST THREE MONTHS (excavation, foundation, framing) are hardest for amateurs. The Thomas house, begun in June, 1950, was this far along after three months.

Aside from plasterers, the union men most often called in are plumbers, electricians and installers of heating equipment. Frequently the owner of the house under construction works as a skilled workman's helper, both to speed the job and to learn how to do it.

Every owner-builder has relied to

READY TO MOVE INTO when the first snow fell, the Thomas home still needed lots of finish work inside. Thomas and his 14-year-old son cleaned it up nights and weekends.





Their building experiences may not have been any broader than his, but they often have read about or observed some detail of house construction that he knows nothing about. They pool their knowledge and frequently offer their labor on a loan basis, to be repaid when they start building houses of their own.

Many a man who has built a home for himself with the aid of the Second Federal has first helped someone else build his. And most of the amateurs have read books on the subject. Maeder, on visits to construction sites, has often found a volume on carpentry or some other pertinent topic lying open on a keg of nails.

#### Back Issues of PSM Helped

Ernest Pocek, a typesetter who now is comfortably settled with his young wife and two lively small sons in a handsome ranch-type house he built in Orange Village, a Cleveland suburb, says he got a lot of help from library books. He also gives considerable credit to a well-worn book in which he had had bound the Mechanics and Homebuilding sections from several years' issues of POPULAR SCIENCE MONTHLY.

Pocek's experience was typical in a number of ways.

He and his wife had spent three discouraging years bunting for a new house more spacious and attractive than the little boxes springing up in neighboring real-estate developments, yet within their means. Finally, they bought an appealing lot with some small trees on it.

"Someday we'll build," they agreed. When they beard about the Second Federal's program, they applied for a loan. First the bank interviewed Pocek, appraising his personality, the seriousness of his intentions, his know-how, his ability to meet payments. Did he have at least \$1,500 in cash? He did.

Then the plans and specifications for the house he proposed to build were carefully scanned. Pocek and his wife had selected a plan from a commercial book of five-dollar plans and had ordered blueprints for it. Nearly every ownerbuilder has chosen his house plan this way. Hardly anyone was competent to draw his own plans or felt that he could afford an architect.

The bank also looked over the bids to furnish materials that Pocek had been collecting. It sent a man out to inspect Pocek's lot. The bank can't afford to risk having to take over a property it would have a hard time selling.

#### Bank Approved Project

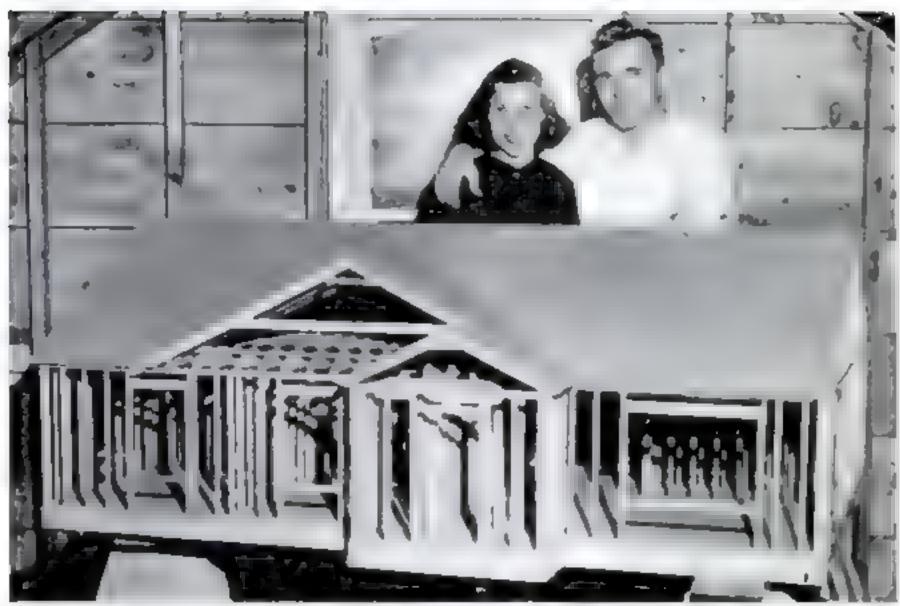
When the loan was approved, Pocek set to work. The day was May 12, 1951.

His only experience for the big job ahead had been gained in a basement workshop in his former home, where he had turned out a few pieces of furniture, a couple of cabinets.



APPRENTICE ELECTRICIAN Harold J. Miller took readily to other phases of house construction. He and his brother built the home below near Cleveland in 11 months.





PRACTICE MAKES PERFECT, and Bart J. Foley, a Cleveland fireman, learned how to build his

house by first making this scale model, oneeighth inch to the foot.

One treasure he had retained from those days was a portable electric hand-saw.

"I couldn't have built the house without it," he said fervently. "Whatever you pay for it you earn back the first week you use it."

Pocek worked on the house nights, weekends and throughout his vacation. His wife helped, as most wives do.

STONE VENEER across front of house below

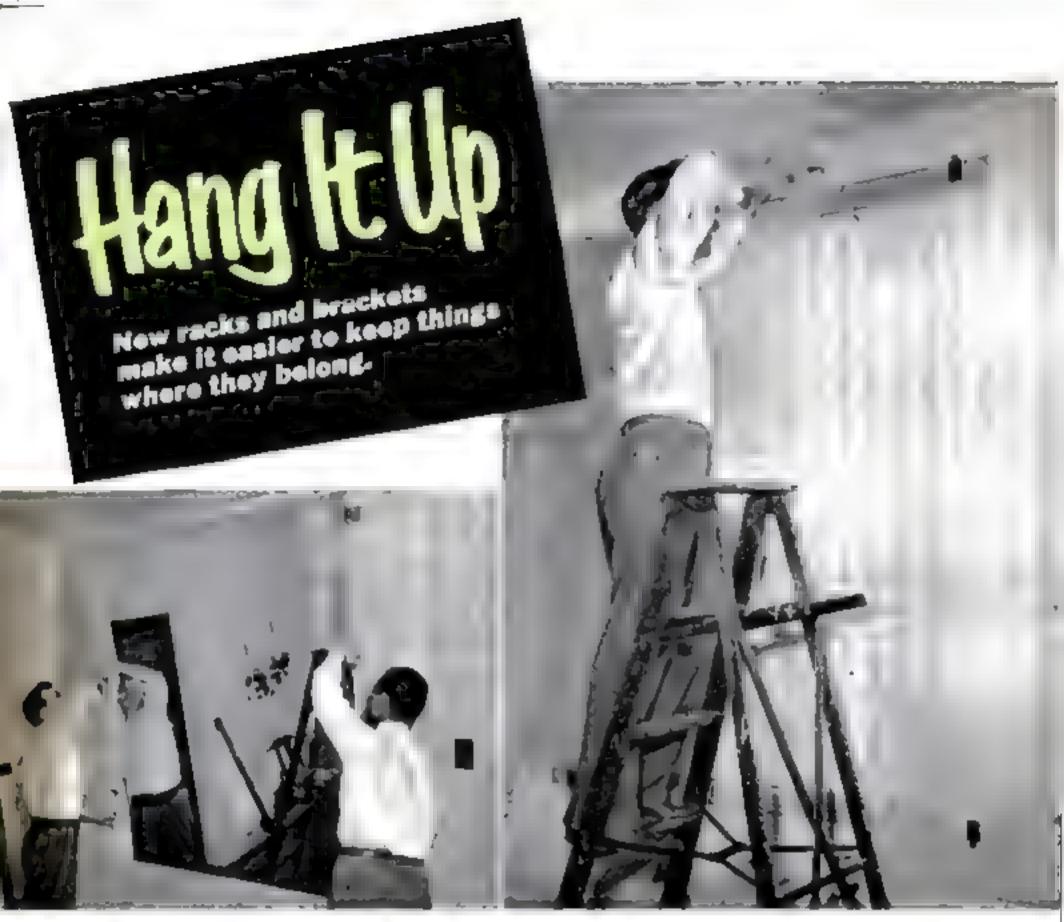
"I got all the dirty jobs," Mrs. Pocek remarked with a grin, "Sanding, filling in nail holes, putting on the priming coat outside."

A union bricklayer built the chinney and fireplace. Union plasterers and heating installers did their parts of the job.

All the rest of the house was built by Ernest Pocek, with occasional help from

[Continued on page 244]



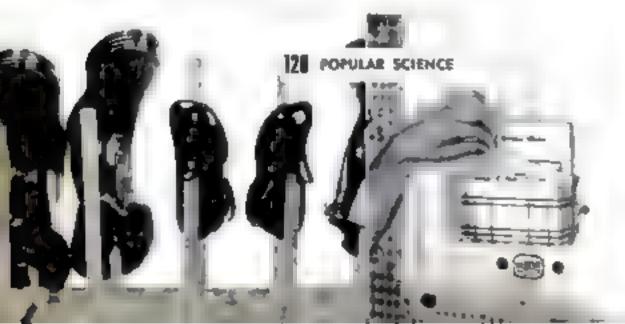


1. Special brackets make hanging a kingsize mirror a job you can handle yourself with an assist from a neighbor for Operation Big Lift, Made of perforated metal with feltpadded clips to hold the mirror, the brackets are fastened to the wall with wood screws or toggle bolts.

The lower bracket goes up first; then the

upper one, with its ratchet clips in a raised position. The mirror is lifted into the clips on the lower bracket and pressed to the wall against the top bracket. The ratchet clips are lowered and the job is done. The brackets are made in three sizes for hanging custom-made mirrors ranging from 28 to 80 inches in length.

- 3. Upended on rods, rainyday footgear dries faster, is kept off the floor. The Rubber Tree holds six pairs.
- Recipe rack hung inside a cabinet door keeps favorite recipes always at the cook's fingertips.
- 5. Glue-on dispenser houses toothpaste tube, delivers a brush-length ribbon of paste when lever is pressed.







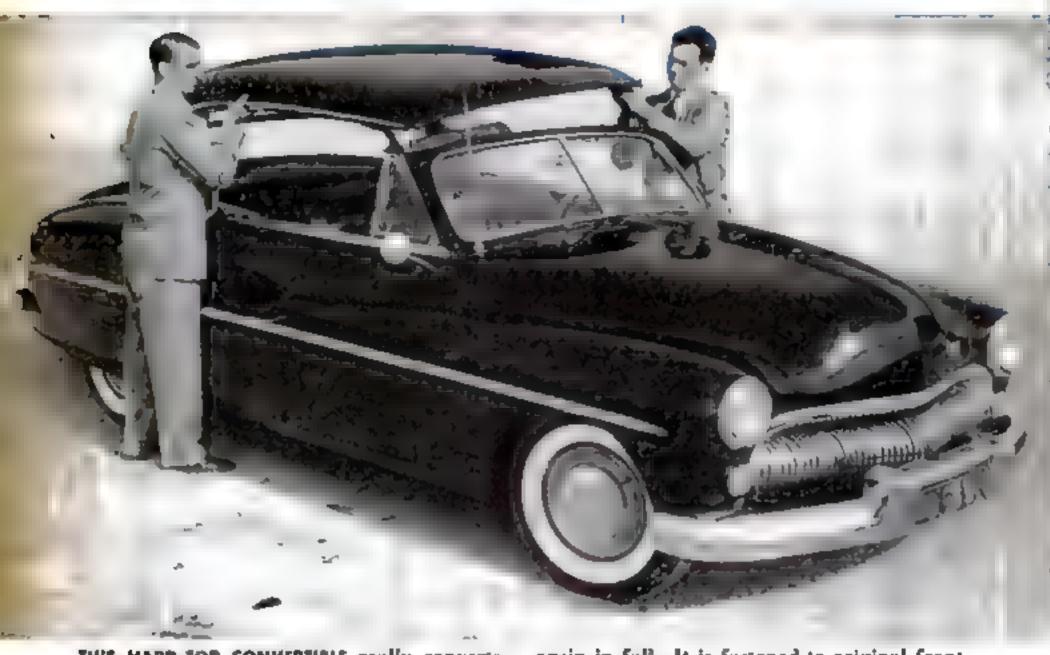
6. Clamp-on rack fits over any six rich door birge gives you extra space for storing or drying elettes.

7. Tilt-up dispenser for content of the first term of shame poors plastic science into all tesive backed swivel mount.

and hales morning screws, hits oil to probe t charman final when room is painted



## They Take Over Where



THIS HARD-TOP CONVERTIBLE really converts. Three men can lift the new Cad-DeVille top off Merc convertible body in spring, attach it

again in fall. It is fastened to original front bow, latched down at rear where 14 inches were added to deck. Mere nose is shaved.

DROPFING BODY but keeping original design is specialty of Neal Emory, left, and Clayton Jensen. First step in slicing five inches from body is using plumb to find widest point of car, which becomes center of cut.

CENTER OF CUT is marked along door panel, using a level. Doors and various supports must be cut so slice can come out all the way around car. Sometimes the seats and floors must be dropped as well.





### Detroit Leaves Off

Two handy ex-GIs have made a flourishing business out of turning run-of-the-line cars into one-of-a-kind eye catchers.

#### By Andrew R. Boone

A COUPLE of fellows in Burbank. Calif., are making a pretty good living backing up new automobiles. They take blowtorches and metal cutters to the bodies and the owners not only approve

of it, they pay for it.

Neal Emory and Clayton Jensen are in the business of cutting automobiles down to size—the size the owner wants. They make 'em longer, shorter, smoother, fancier—but mostly they make 'em lower. A car owner drives in to their Valley Custom shop and says, "Make her look different from those squares coming off the Detroit production lines."

The partners oblige on anything from a '33 Ford to a '53 Caddy. When they get through, a car often looks much as it did before, except that it is squeezed down

to a midget's line of sight

METAL IS SLICED OUT along five-inch steep with air-driven cutter. Most radical job done by shop was bringing down the top of a '41 Ford 18 inches while keeping six inches' road clearance. Partners trimmed bottom of body.

From the beginning, the partners have stuck to one formula: "Do the job as they would in Detroit, if their engineers sought the same effect. Keep the original proportions. Don't hide poor contouring under a blanket of lead. Turn 'em out so they look good from a distance, but even handsomer close up."

As a result, Valley Custom's eye catchers have won show prizes and brought more business than the partners can handle. They also have turned out some

record-shattering hot rods.

For the guy who wants to do the work himself they've cooked up a special body-

lowering kit.

The partners discourage customers from visiting the shop during the early stages of a teardown. They figure an owner might get apoplexy if he saw them rip out a strip of sheet metal clear around the body or tear out the insides.

FIVE-INCH STRIP is peeled off section by section. After the two halves are welded together bead is torched and hammered flat against bucking bar. Then the surface is ground and filed smooth. Please fars page for more photos.

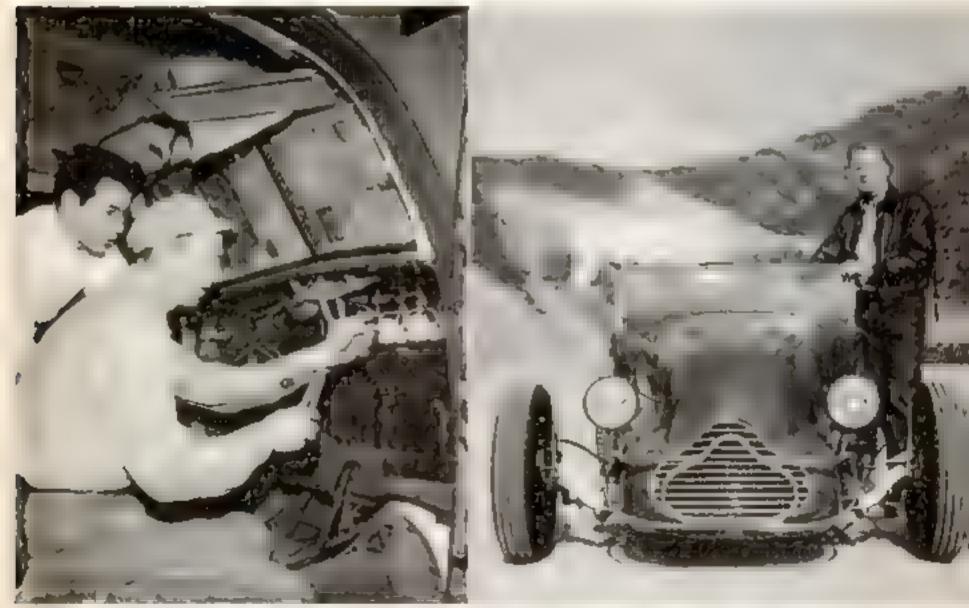






RECOGNIZE IT? This traffic-stopper began life as a '51 Plymouth custom convertible. The front end, which resembles a new Chrysler V-8 installation, was made from two Plymouth '51 grilles to give a massive effect. Note how the painted panel under the humper hales the running gear and helps give the conversion a

low look. Partners Emory and Jensen believe that conversions should be functional and comfortable, with pienty of headroom and clearance for rough roads, but they give the customer what he wants. On late-model cars they sometimes lower cult springs 2½ inches with a patented arm that raises spindle.



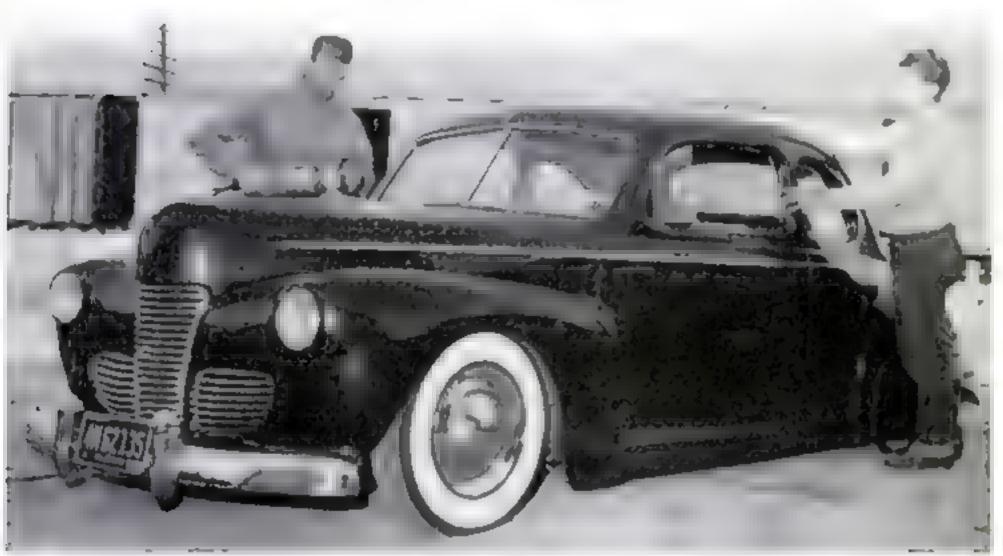
SOLENOIDS for an electric push-button door lock are installed by Clayton Jensen in a fancy job. A full custom conversion—sectioning, cleaning up, channeling, lowering and sometimes cantouflaging—may run to \$5.000. Majority of customers want semi-custom job—mostly removing ornaments, chrome.

THIS 143-M.P.H. SPEED WAGON for dry-lake racing was once a Model A roadster. Now it really looks like a competition job, and houses a '40 Merc engine. Louvers in top of hood help cooling. Lubular humpers were designed by owner Dick Flint of Glendale, Calif. Car interior is finished for town use.



STRAPS AND CRASH PAD have been added to Plymouth's interior for safety in fast driving. During five years in business, Jensen and Emory have made major or minor conversions on nearly 1,000 cars. Occasionally they sketch a design, but only for customer; details are worked out in their minds.

EXHAUST PIPE extends through fenders above bumper on converted '51 Plymouth. Rear fenders are '51 Chrysler, altered to fit. Longer fenders and continental spare-wheel kit make the Plymouth look longer and larger. Partners emphasize smooth metal work, say best lacquer cont can't hide a bum metal job.



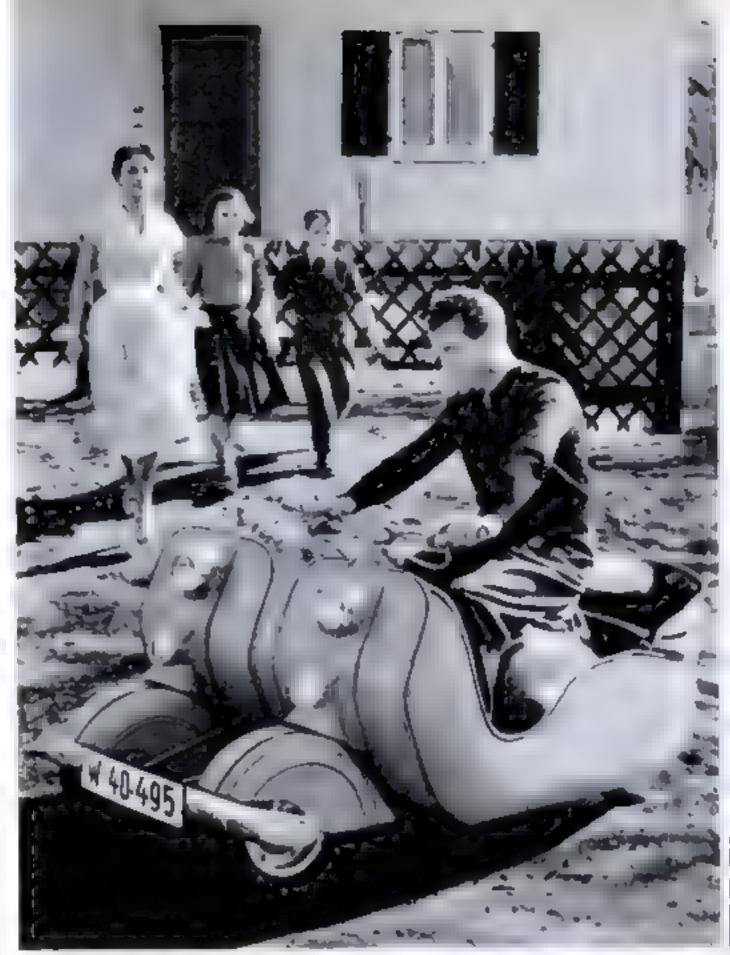
JOS DONE, partners give final polish to a low-down '41 Ford coupe. With seed frames, car has only three-inch clearance, which limits it to smooth highways. Customizers removed and welded over 20 seams. Butterfly grille gives final swank touch to nose. Besides custom and semi-custom jobs, partners figure on

two main types of conversion. Hot-rodders want racy appearance to match their souped-up engines. And owners of foreign cars usually want them made lighter for racing. Partners, who are married to sisters, work like mechanical twins; both contribute ideas, either can pick up a job where other leaves off, END

### It's a Joke, Son

WHEN the boys at the NSU Works in Neckarsulm, Germany (motor-cycles, bicycles), work up a gag, they go about it with the methodical planning that Teutens are noted for, "A good technical joke," they say, "must be nonsense—but still on the border line of reality."

How well they succeeded is shown by the pictures on this page. All four
'new products' are strictly for fun, not for sale.
But they look so reasonable that PSM editors were
marveling at the fresh,
though wacky, unagination of German designers—
until translation of an obscure section of the German captions gave the
joke away.



**DOUBLE SCOOTER**, the NSU jukesters claim, solves an old problem for the cyclist whose expanding family needs a four-scater-

MOTORCYCLE FIRE ENGINE, presomably for small fires, even has its own engine-driven pump to squirt water. of girl hicyclists on breezy days. The user would have to unchp it to leave the bike. REMOVABLE MOTORCYCLE EN-GINE runs saw through flexible shaft. Also recommended for powering a fluor polisher.



# By Herbert O. Johansen

#### The Navy's new aerial weapon carries no bullets, rockets or bombs. Come along on a flight in this electronic mastermind.

A HALF-HOUR before midnight we file into the briefing room carrying steaming mugs of coffee. Rain beats against the windows and the howl of a high wind penetrates the hangar of AEW Squadron VW-2 at the Naval Air Station. Patuxent River. Md.

Pointing to a chart on the wall and circling an area over the Atlantic off northern Florida, the operations duty officer begins, "Weather in the operational area is marginal instrument with heavy seas."

Our mission is to relieve an airplane on station and fly an AEW (Airborne Early Warning) radar barrier patrol for a fleet task force making its way up the U. S. east coast for an attack on "enemy" forces at Cherry Point, N. C.

The briefing officer gives the position of the task force as 365 miles east of Jacksonville. Two hours before sunrise the carriers Coral Sea and Franklin D. Roosevelt will launch air strikes against black (enemy) shore targets. Enemy air attacks from shore are expected.

Coffee mugs are drained hurriedly and we file down the stairs, through a hangar door and out into the wind-whipped downpour.

There are 32 of us, including three pilots, two navigators, eight CIC (Combat Information Center) officers and controllers, two electronic countermeasures officers, two radarmen, two radio operators, two flight engineers. But there is only one plane for all of us—a triple-





THE AEW CONSTILLATION bulges top and bottom with radomes. The top bulge houses an-

tenna for height-finding radar, used for first time on this Navy air-fleet exercise.

tail, four-engine Constellation. It is silverskinned like the commercial Connies you see at the airport—but with a difference.

On top of the fuselage is a large plastic hump housing the antenna for height-finding radar. From the belly protrudes another odd-looking radome, containing the antenna for the airborne search radar. The spine of the fuselage is saw-toothed with additional short, stubby radio antennas.

In the main cabin all resemblance to a commercial airplane ceases. It looks more like an oversize control booth of a television studio.

On both sides of a center aisle are several consoles with 12-inch radarscopes at the center of a complex of switches, dials, knobs and buttons. At each console is an upholstered swivel chair with a safety

belt. Spaces in between are packed almost solid with electronic gear.

As the crew settles in take-off stations, I plunk myself down on the upholstered lower part of a double-decker bunk.

"Why not make yourself really comfortable?" asks a young lieutenant (j.g.). He pulls down the top bunk. It becomes the back of a living-room-like sofa. There are four of these.

He hands me a radio headset with an attached swivel microphone and plugs it in an outlet. I adjust the earphones as the j g. flips a switch.

There is a crackling in the earphones. Then the pilot's voice: "Patuxent Tower. This is Seven Baysides ready for take-off."

There is a pause and the tower replies: "Roger. This is Patuxent Tower, Seven



AIRBORNE COMBAT Information Center is a busy place when search ender picks up an

"enemy" plane. Its location must be pinpointed to guide interceptors to the kill.

Baysides. Switch to Patuxent flight control when airborne."

"Who's Seven Baysides?" I ask my j.g. "That's us," he informs me. "Our code name. You'll get more of them when we get out to the task force. The Coral Sea, the command ship, is Birch Tree, and the FDR is Small Fry."

Soon after we are airborne the CIC officer checks with the flight engineer for any signs of gas leaks or fumes. Only when he gets an all-clear back does he order the radar gear switched on.

The radarman adjusts his scopes and reports, "Radar okay."

With that, one of the CIC radar control officers tunes in his scope. As the sweeping arm establishes a clear picture of the terrain below on his scope, the navigator calls back for a radar fix. The control officer identifies Elizabeth City, N. C., and marks it on his scope glass with a yellow grease pencil. Then he presses a button that makes a bright pointer line appear. This doesn't sweep around but can be moved by a knob to any position on the scope and fixed there. He moves the pointer line to connect the center of the scope (our position) and Elizabeth City. He next presses a button and the range (distance in miles) appears in a glass window on his right. He presses another button and the bearing in degrees shows up in a window at his left.

With this information he calls the navigator: "Elizabeth City now due south 120 miles."

"How about some coffee?" asks the j.g. We follow the aroma forward to a chromium-shiny galley, complete with



RADAR OPERATOR tunes equipment and maintains it so that controllers get best possible scope picture. Electronic circuits use 1,400 separate tubes of 300 different kinds.

THE AUTHOR takes a turn at tracking a blip on one of the radarscopes. It turned out to be one of our carriers. Man in foreground is operating the height-finding radar.

electric grills, hot plates and a sink with running water. A pot is perking merrily. Across the aisle, under the navigator's table, is a small electric refrigerator.

"We can feed the whole bunch in 45 minutes," my heutenant informs me proudly. "When we have steaks it takes a little longer."

"Glad to have you aboard, Mr. Johansen," says a voice at my elbow. "Mind if I join you?"

I recognize Commander Harry A. Rowe, skipper of AEW Squadron Two. The CIC compartment, which takes up the greater part of the fuselage, is as dim-ly lit as an off-street night club.

#### Skipper Is Veteran Pilot

The 39-year-old skipper is a veteran pilot and an authority on electronics and air defense. In 1944 he was Air Defense Force Director of Admiral John McCain's famous Task Force 38 in the Pacific.

AEW, Commander Rowe explains, was born of necessity during the latter part of World War II in the Pacific. Because radar operates on a line of sight, Jap planes were able to sneak in at low altitude without being detected until it was too late. That's the way a single Nip bomber put the carrier Franklin out of commission. This same low-flying, radar-evading tactic was used by Jimmy Doolittle when he attacked the Japanese

mainland earlier in the war. And it is a tactic that could be used by an enemy against the U. S. mainland today

There is a limit to how high a radar antenna can be placed on a ship. The obvious solution was to elevate the antenna by placing the radar in an airplane Late in 1944 a powerful, million-watt, but small and lightweight radar unit, developed by the Navy and the Radiation Laboratory of MIT, was put in a belly-bulging Grumman Avenger. It was first called the Guppy, later Cadillac I, because it was first tested on Mount Cadillac. Me.

The trouble with Cadillac I was that it couldn't be kept in the air long enough and its radar wasn't "ground-stabilized." The scope information that the pilot relayed to the carrier didn't take the wind or speed and drift of the airplane into account.

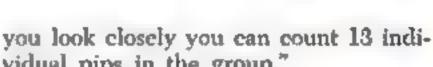
#### Flying Fortress Picked for Job

One solution was to take a CIC unit out of the carrier and put it up there in a plane with the radar to evaluate the scope information and to direct fighter interceptors to their targets from the air.

That called for a larger aircraft, A B-17 Flying Fortress was picked for the job. Then the radar equipment was improved by adding circuits that enabled the navigator to feed in electronic compensation



RADARSCOPE PICTURE looks like this. Light areas at lower left are shore line. Blips around center spot are ships and planes. Movement of a blip indicates an aircraft.



A RUNNING PICTURE of what the radar "sees"

is transferred to a chart. Electronic plotting

computers are being installed in the new

AEW Super Constellations now in production.

vidual pips in the group."

"But maybe they're airplanes?"

"No. That's one reason why pips are

"No. That's one reason why pips are circled on the glass with the grease pencil. As the radar sweep arm swings around, you'll notice that the pips don't move. If they were planes, they'd have moved outside of the grease-pencil circle by now. And, incidentally, it's by checking the rate of movement of a pip that we estimate the speed of a plane."

That took us to the console of the electronic countermeasures officer, who

[Continued on page 240]

for speed, drift and wind. Twin repeater scopes were installed and their pictures from the master radar were the same as if the equipment were on the ground, anchored in concrete. That was Cadillac II.

Next came the Connie we are flying—Cadillac III. On the way is still another new Cadillac—an AEW version of the Lockheed Super Constellation, It will be larger, faster and, naturally, have more and better radar gadgets.

#### Radar Picks Up Task Force

The CIC officer interrupts Commander Rowe to announce that the task force has been picked up on the radar. We walk down to his position, which is amidships on the port side, facing out. I lean over and see that as the arm sweeps around the scope it brings out a group of bright pips in the lower right section. That is the task force. The CIC officer had outlined the positions in yellow grease pencil. He brings his pointer line into play, positions it and presses the range button. In a window at his right appears the distance in miles—well over 100.

"How do you know those pips are the task force?" I ask Commander Rowe.

"Experience plus information. At our briefing, you'll recall, we were advised of the location of commercial shipping in the area and also of the location and number of ships in the task force. And if



SEVEN BAYSIDES RETURNS from a 17-hour barrier-patrol mission. Other jobs of AEW are submarine hunting, and tracking hurricanes to give cities advance warning of danger.



#### One Man Can Hitch Up Tractor

Writt this hitch, a farmer can back a tractor up to any implement and lock it on behind without leaving his seat. It lifts and grips a bar on the tongue of the implement. A pull on a cord frees the tractor. Alprodeo, Inc., Kempton, Ind., makes the hitch.

#### Flies Trapped in Labyrinth



BATTED with a piece of raw meat, the trap at left lures flies and bees down a twisting tunnel into the jar. Once inside, insects can't find their way out and a bit of insecticide at the bottom of the jar kills them. The Myon Products Co., Los Angeles, makes the Fly-Trap for use in barns or just outside the house.

#### Snake-Bite Kit Fits Pocket

HERE's everything you need for first aid in snake country. Tape for stopping circulation, kinfe and vial of antiseptic pack into rubber suction cups that remove venom. Cutter Laboratones, Berkeley, Calif., makes the kit.





#### **Magnets Hold Chessmen**

Tray magnets hidden in this chessboard keep metal playing pieces from skidding if the board is tilted or joggled. Designed for fans who like to take their favorite game along when traveling, it was exhibited at a German leather-goods fair.



#### She's a Tire Sculptress

Ann odd jobs—sculpturing tire treads. June Adair (above) works on raw clay molded over a wooden form. From this, Firestone makes plaster casts, then metal molds.

132 POPULAR SCIENCE



#### Toy Car that Really Runs Runs into Parking Trouble

JOHN LAW could put the arm on this youngster for illegal parking near a fire hydrant, or even for dangerous driving, because this tiny plastic car actually runs. But six-year-old Brian Dunne will never have to worry about tickets for speeding.

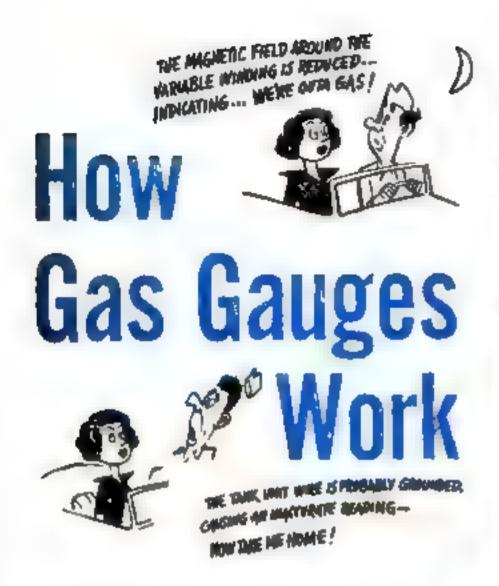
The 62-inch-long car runs on power from a six-volt battery and travels at only five miles an hour. Designed to give a child the thrill of driving at a safe speed, it was shown at the American Toy Fair this spring. lunior can own one for \$500.

#### They Say Now.....

"The success of the scientific method in practical matters has depended upon the rejection of pure reason as the court of last resort, and the substitution of observational tests for logical tests."—
MAURICE B. VISSCHER, UNIVERSITY OF MINNESOTA PHYSIOLOGIST.

"The nation that wins the next war will be the nation that develops alloys for use at high temperatures."—Robert F. Mehl, Carnegie Institute of Technology.

"Some day, even in peacetime, the nucleonics industry will be bigger than the iron and steel industry."—ZAY JEFFRIES, VICE-PRESIDENT, GENERAL ELECTRIC,



Dashboard robots strain to give you accurate fuel-level readings from "E" to "F."

BUSY midgets make your fuel gauge work. In some makes of our two of them flex magnetic muscles in a tug of war that tilts the indicator needle. In others the midgets squirm uncomfortably in electrically heated jackets, while clinging to the pointer for support.

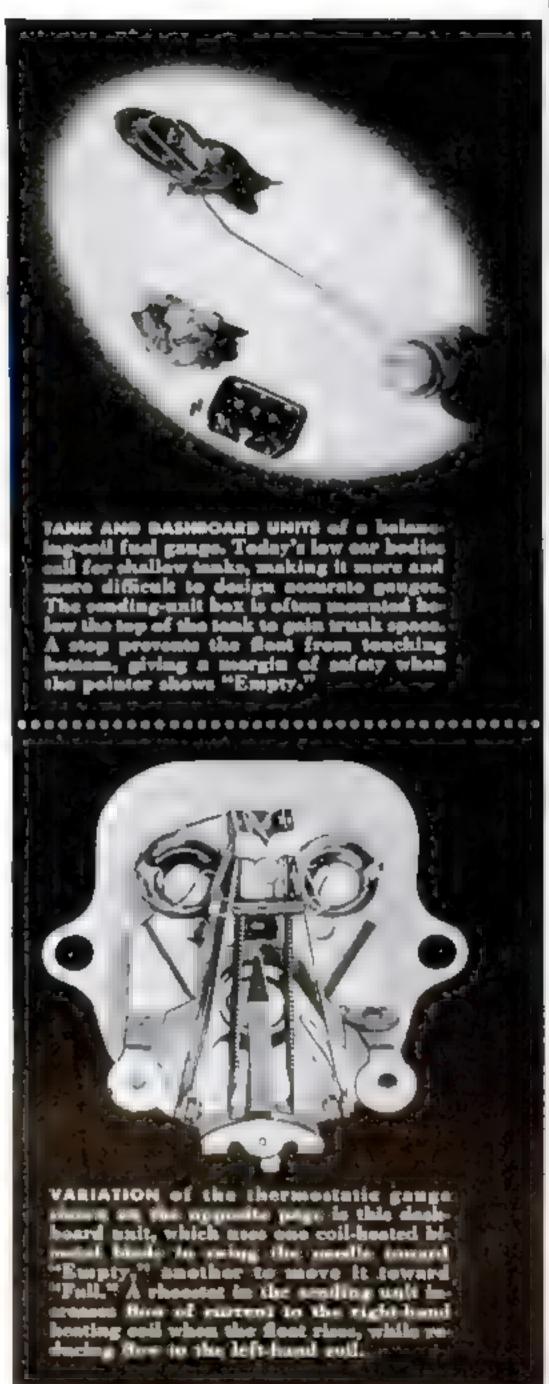
Whether your car uses the balancingcoil type of gauge or the thermostatic type, the behavior of the midgets is governed by a cork float which rests on the surface of the gasoline at a point near the center of

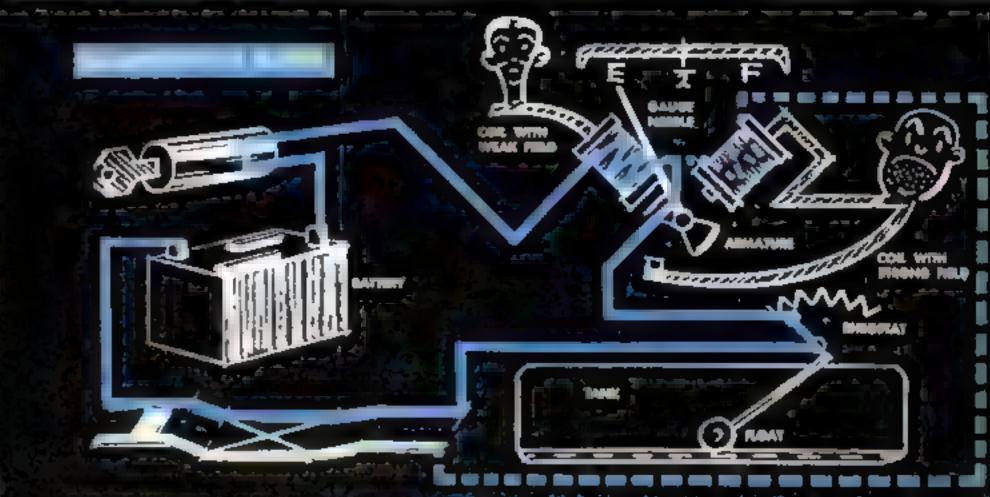
the fuel tank.

The up-and-down action of the float is passed through a wire arm to a sending unit in a small box. This sending unit may be a rheostat or a cam, depending on the type of gauge and the manufacturer. In either case its, business is to transmit electricity to the dashboard unit. In the balancingcoil type it decides which of the two magnetic midgets is to win the tug of war with the pointer. In thermostatic gauges, it makes the two coil-heated midgets bend the exact distance peeded to give an accurate fuel reading.

The two drawings on the opposite page show just how the midgets say: "Brother,

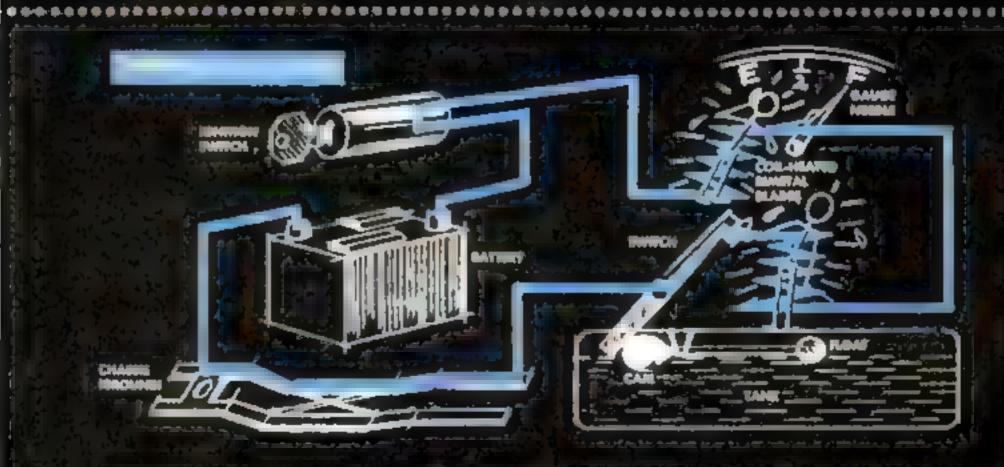
it's time you headed in for gas!"





BALANCHIO-COM PURE GAUGE has two small magnets back of the dial. The one at the right is stronger because it has a langur core extension. When the ignition is turned on, two sleetile circuits are not up—one to food each magnet. If the tank is empty, the float arm outs out a riscount, and all correct goes to the fest-hand magnet, pulling the pointer to "Empty." When the fuel level is ruled the

float outs in the chantet, making it harder for juice to pass through the left-hand make not. More and more current flows to the right-hand magnet, and the pointer evings toward "Pull." Retation of field force—not the strongth of the current—produces the reading. That is what the gauge is consistently accurate, whether the bettery in your ear is fully charged or weeks.



turn on the haditen, sending surees themselves colle of redstance wire, and would around a himself blade. The blades are identical, and head equal distance when heated by the colle. To make the himself twins show the right fuel level, one is placed in the rank's control unit and the other in the garge. As the float rices, a cam moves a lever against

the tank blade, bending if the right distance for an accurate fuel-gauge reading. The tank blade was't bend further mutil heat has warped in the same position. Since more best would make both blades yo an banding, a switch opens every time the tank blade branks away from the lever, returning both of the blades to their right positions.

## Earthquakes Are His Hobby

West Coast engineer builds his own seismograph to keep tabs on the world's lively pulse—and shows you its shakes while you wait.

#### By Harry Walton

FRED ROBINSON, an engineer for a utilities company, keeps his hobby going 24 hours a day. His private seismographic station on Point Loma, overlooking San Diego Bay, takes the earth's pulse day and night.

Robinson's instruments may break into furious activity any moment. An automatic alarm attached to his seismograph sometimes rouses him from bed. But if you think there's nothing doing between such high spots, walk into his workshop-

lab any evening.

The most prominent thing in it is a steel pyramid about six feet high, but your eyes are drawn to a small panel board on which a red lamp glows. It's labeled West. An electric meter beside it shows current flowing.

"That's not a quake," he explains. "The mountains are cooling off now, and the contraction pulls the crust that way."

The ground suddenly seems a bit less solid underfoot.

"Watch the other lamps," says Robinson, and you stare at the five unlit ones.

Just before you get restless, another lamp flashes. The meter needle quivers.

That's a very minor movement south of here," you are told.

Near the tower, in a glass-topped case, a recording drum turns slowly under three pens. Any quake above a very low intensity shows as a jiggle of the straight lines. Remembering how hard it is to write if the paper slides under your pen hand, you may wonder how, with the very ground moving underfoot, either drum or pen stays put while the other forms the juggles.

#### Inertia Does It

Mounted near the tower on long spring leaves are two tiers of storage-battery cases filled with metal slugs. Because of their mass and spring mounting, the cases



#### Light Gun Does NOT Rest on User's Nose

A LICHTWEIGHT machine carbine, being considered for use by the British army, is demonstrated at Hythe, England, by T. A. McCluskey, sergeant-instructor, Known as the Patchett gun, it looks as though it were resting on the user's nose. Actually, the weapon has a collapsible stock that is snugged against Sgt. McCluskey's shoulder. The new gun is being tested at Britain's infantry school.

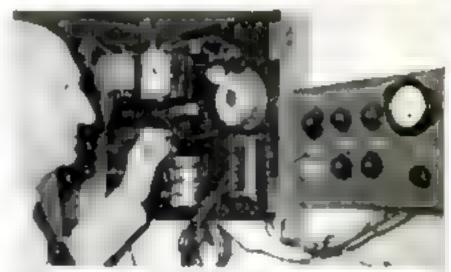


ctockwork-brive brum turns once an hour and is also shifted endwise, so that spiraling pen lines trace the hours. A solenoid under the window lifts center pen once a minute to fix time within seconds. Robinson's records go to government and university stations.

tend to remain relatively at rest while the earth, floor and tower move.

Slender bars pivoted on a crosspiece of the tower are linked to bearing cups on the weighted cases. The longer ends of these bars carry the recording pens.

[Continued on page 246]



ELECTRIC PANEL SOARD controls clocks and time-recording equipment. Lamp panel and meter at the right signal even very slight movements of the earth's crust as you watch.

#### Phone Designed for Patient in Iron Lung

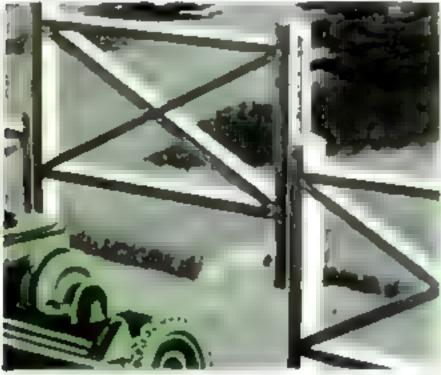
When three telephone men were asked to provide a man in an iron lung with a telephone, this is what they devised. The main problem was a switch that could be worked by a patient who could move only his head. The solution was a small box with a levertype switch in it, attached to a long rod with a rubber tip. The patient opens and closes the circuit by hiting on the tip and turning his head.



JUNE 1953 137

## I'd like to see them make...

Everyone has his awa pet idea of some gadget he would like to see in general use. What is YOURS? Popular Science Monthly will pay \$5.00 for each one published. Use government pastcards only Contributions cannot be acknowledged or returned.



A GARDEN FENCE that could be raised up, riding on tracks in the supporting posts, to climinate the tedious job of edge trimming.—
Laurence Bridges, Kings Mountain, N. C.



A REFRIGERATOR ICE-CUBE TRAY for freezing ice in small enough pieces to fit into a small-necked vacuum bottle.—Harold Charles, Indianapolis,



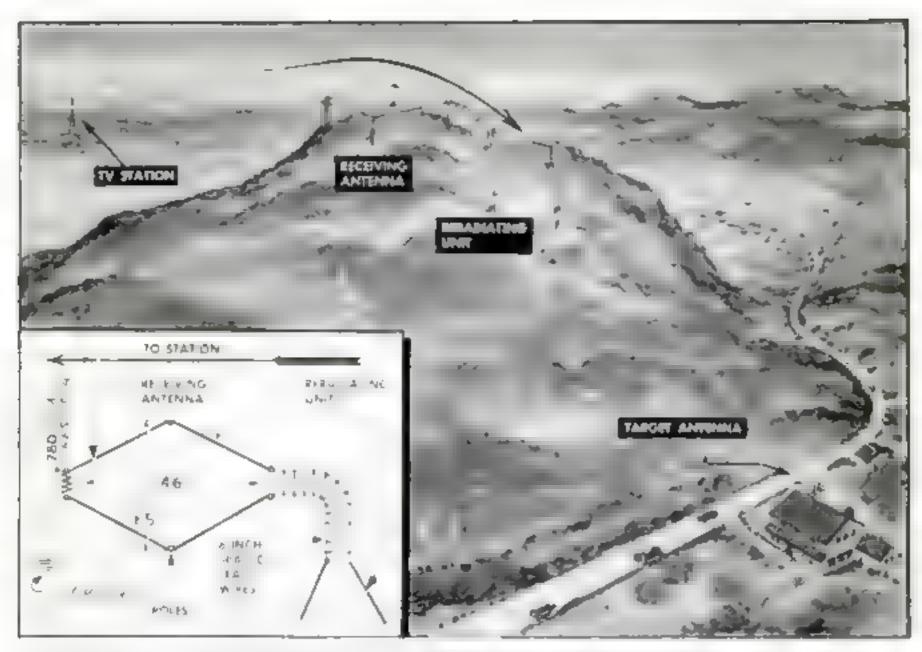
DISPOSABLE SUN LENSES for use over regular glasses. Paper-thin plastic, adhesive-backed to stick with pressure yet strip off easily, would do the job.—H. Gage, S. Chatham, Mass.



A BEACH UMBRELLA with a threaded, coneshaped metal tip on the handle so that it could be inserted in the sand with less of a struggle. —Alfred Manhan, NYC.



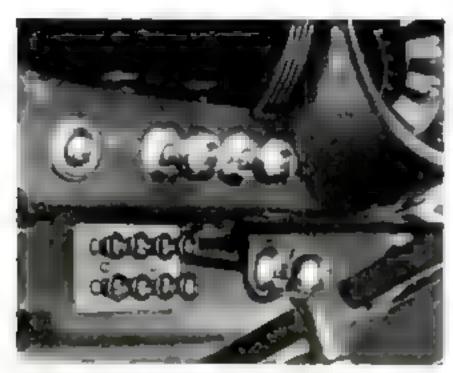
A CLIP-ON SED FAN with a gooseneck so cool air could be directed to flow over length of the bed, yet not blow directly on head of the sleeper.—R. Murdock, New Canaan, Conn.



#### Homemade Relay Bends TV Over Mountain to Valley Home

A PRIVATE relay station that uses no electricity brings television shows over a mountain and down to the valley home of Col. Victor C. Huffsmith of the Denver Research Institute. The relay station is just two rhombic untennas—large, but inexpensive and easy to build—that could be copied by others who find TV reception similarly blocked.

The receiving antenna, aimed carefully at the transmitting station, picks up the signal and feeds it to the reradiating antenna, which rebroadcasts it through the air to the television-set antenna at the house.



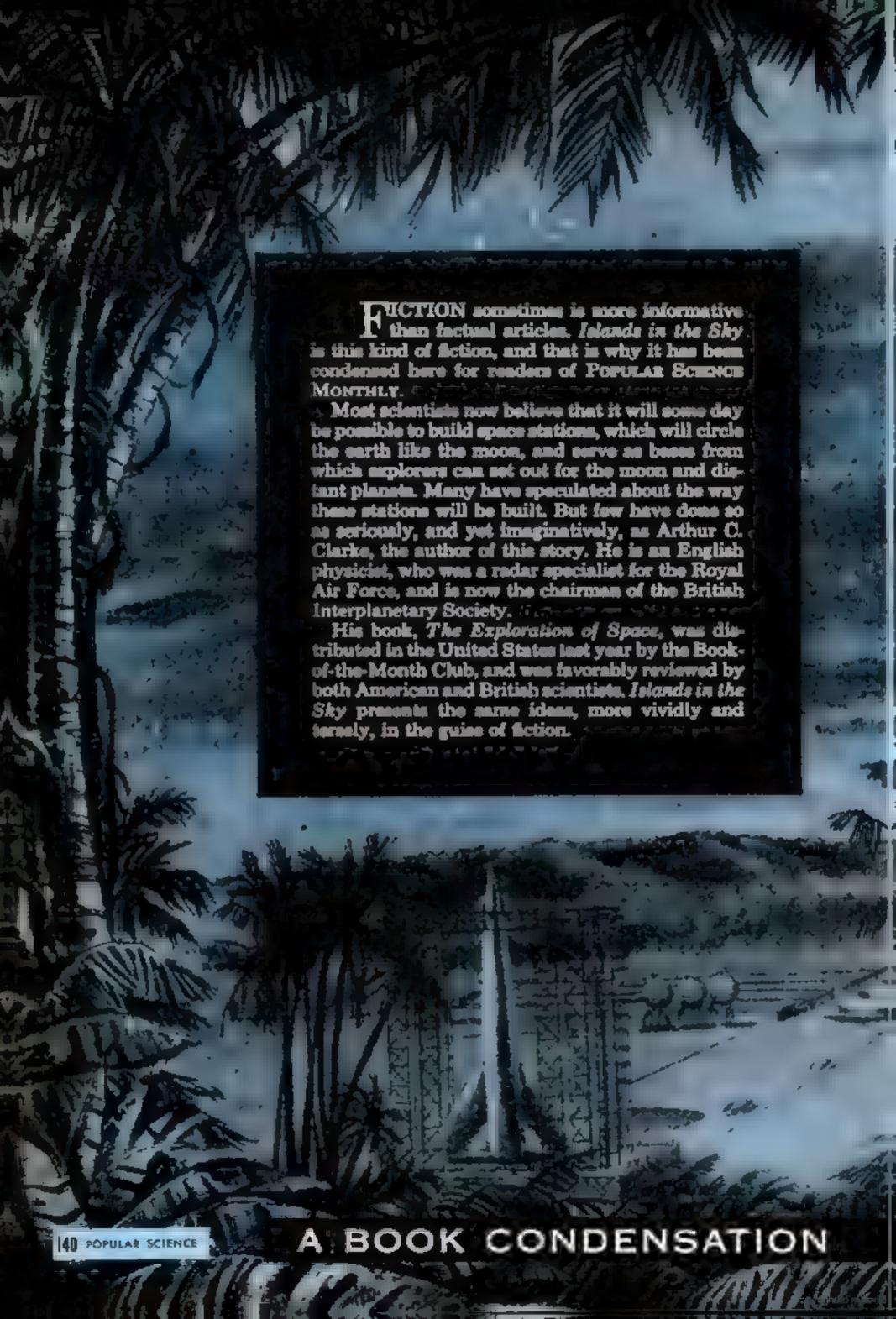
#### **Buttons Replace Car Key**

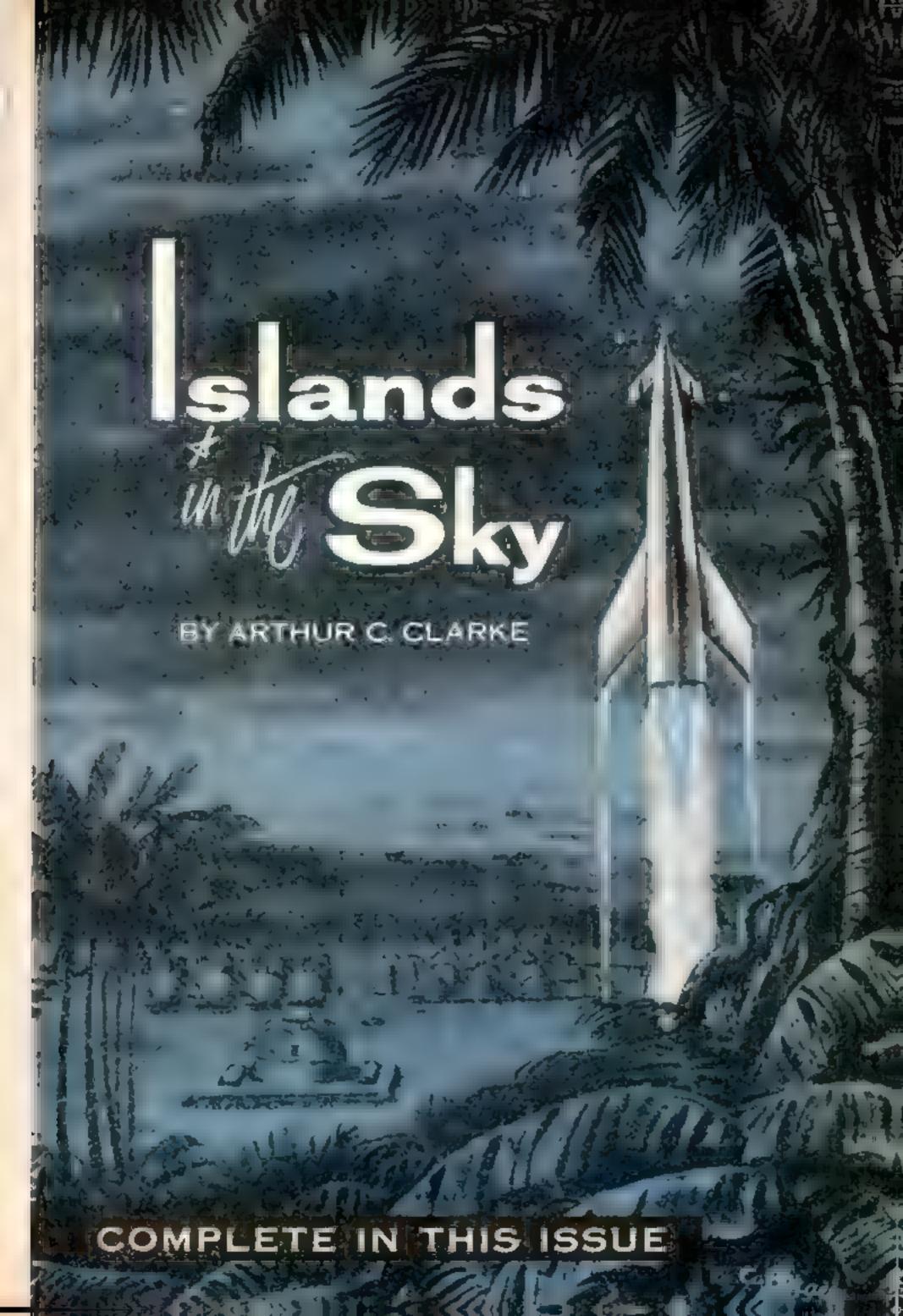
You have to push the right buttons on this box under the dash to start the motor. Four buttons are used in a code known only to the owner. Victor Devices, Chiton, N. J., sells the Start-O-Code in kit form.

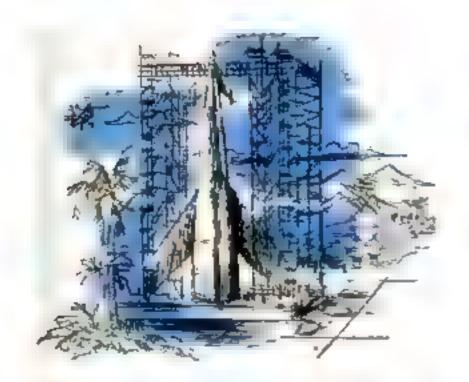


#### Plastic Tubs a One-Man Load

Now they're making bathtubs of glass and plastic, just like sports-car bodies. They weigh only 20 pounds, cost less than porcelain and won't chip. The Carl A. Strand Co., Birmingham, Mich., makes them.







HE New Guinea mountains, just south of the Equator, must once have been among the wildest and most inaccessible spots on earth. Although the helicopter had made them as easy to reach as anywhere else, it was not until the twenty-first century that they became important as the main springboard into space.

They are so near the Equator that, because of the earth's spin, they're moving from west to east at a thousand miles an hour. That's a useful start for a ship on its way out to space. Their height puts the denser layers of the atmosphere below them. Thus air resistance is reduced and rockets can work more efficiently.

And, finally, ten thousand miles of open Pacific stretch away from them to the east. You can't launch spaceships from inhabited areas because, spart from the danger if anything goes wrong, the noise would deafen everyone for miles around.

Port Goddard is on a great plateau, leveled by atomic blasting, almost two and a half miles up. There is no way to reach it by land—everything comes by air. It is the meeting place for ships of the atmosphere and ships of space.

When I first saw it from our approaching jet, it looked like a tiny white rectangle among the mountains. Great valleys packed with tropical forests stretched as far as one could see. When I stepped out into the cold, clear air, I already felt so far above sea level that I looked up into the sky to see if I could find my destination, Space Station One.

But I wasn't allowed time for the search. There were forms to be filled. I was weighed carefully and given pills to swallow (they made sure that I did too), and we climbed aboard a little truck that would take us out to the launching site. I was to be the only

passenger, as the rocket on which I was traveling was a freighter.

Most spaceships, naturally enough, have astronomical names. I was flying on the Sirius, one of the smaller ships. She had already been raised in her cradle so that her prow pointed at the sky, and she seemed balanced on the great triangles of her wings. These would come into action only when she glided back into the atmosphere on her return to earth; at the moment they served merely as supports for four huge fuel tanks, which would be jettisoned as soon as dry.

The servicing gantry was still in position, and when I stepped into the elevator a motor began to whine. The metal walls of the Sirius slid swiftly past, the elevator came gently to a halt, and the gates opened onto a short gangway. I walked across it, through the open seals of the air lock, and brilliant tropical sunlight gave way to the cold electric glare of the ship's control room.

The pilot was already in his seat, going through the routine checks. He swiveled round and gave me a cheerful grin.

"So you're Roy Malcolm? Have you flown in a rocket before?"

"No," I replied.

"Then don't worry. Make yourself comfortable in that seat, fasten the straps, and relax. We've got twenty minutes."

I climbed into the pneumatic couch, but it wasn't easy to relax. After years of dreaming, I was aboard a spaceship at last! In a few minutes, a hundred million horsepower would be hurling me up into the sky.

THE pilot was talking to the Port Control Tower over the radio. Every so often a time-check broke through: "Minus fifteen minutes . . . Minus five minutes."

At last the pilot said "Over to Automatic" and threw a large red switch. He gave a sigh of rehef and leaned back.

"That's always a nice feeling," he said.
"No more work for the next hour!"

He didn't really mean that, of course. Although the robot controls would handle the ship, he still had to see that everything was going according to plan. In an emergency, he would have to take over.

The ship began to vibrate as the fuel pumps started to spin. A complicated pattern of intersecting lines appeared on a TV screen. Tiny lights changed, one after another, from red to green.

I snuggled down into the couch and then,

without warning, felt as if someone had jumped on me. There was a tremendous roaring in my ears. I seemed to weigh a ton. It required a definite effort to breathe.

The discomfort lasted only seconds, then I grew accustomed to it. The ship's own motors had not yet started, and we were climbing under the thrust of the booster rockets, which would burn out and drop away after thirty seconds.

I could tell when they did by the sudden slackening of weight. It lasted only a moment, then there was a subtly changed roaring as our own rockets started to fire. They would keep up their thunder for another five minutes. At the end of that time, we would be moving so swiftly that the earth could never drag us back.

The thrust of the rockets was now giving me more than three times my normal weight. I tried to see if I could raise my arm. It was very tiring. I think I could have sat upright if necessary, but standing would have been impossible.

On the TV screen, the pattern seemed unaltered. Now, however, a tiny spot crept slowly upward—representing. I supposed, the ascending ship. I watched it, wondering if the motors would cut out when the spot reached the top of the screen.

Long before that happened, there came a
series of short explosions, and the ship
shuddered alightly. I
thought that something
had gone wrong. Then I
realized our drop tanks
had been emptied, and
the bolts holding them
had let go. They were
falling back and would
plunge into the Pacific.

At last the thunder of the rockets began to lose its power, and the feeling of enormous weight ebbed away. The ship was easing into its final orbit, five hundred miles above the Equator. The motors had done their work and were now merely making adjustments to our course. Silence returned as the rockets cut out completely.

The pilot finished checking his instruments and then released himself from his seat. I watched him, fascinated, as he floated across to me.

"It will take you some time to get used to this," he said, as he unbuckled my strap. "The thing to remember is—always move gently. And never let go of one handhold until you've decided on where you're going next."

Gingerly, I stood up, I grabbed the couch just in time to stop myself from sooming to the ceiling. "Up" and "down" had vanished completely. Weight had ceased to exist, and I had only to give myself a gentle push and move rapidly in any direction I wished.

It's strange, but even now there are people who don't understand "weightlessness." They seem to think it has something to do with being "outside the pull of gravity." That's nonsense, of course. In a space station or a coasting rocket five hundred miles up, you feel weightless not because you're outside gravity, but because you're no longer re-

sisting its pull. You could feel weightless, even on earth, inside a freely falling elevator—as long as the fall lasted. An orbiting space station or rocket is in a permanent fall—a "fall" that can last forever because it isn't toward the earth but around it.

"Careful, now!"
warned the pilot. "I
don't want you cracking your head against
my instruments! If you
want to look out the
window, hang on to this
strap." I obeyed him
and peered through the
thick plastic—all that
lay between me and
nothingness.

My field of view was

almost entirely filled by the Pacific Ocean. It was a surprisingly deep azure, which softened into a misty blue at the horizon. I asked the pilot how far away this was.

"You can see most of the way down to New Zealand and up to Hawaii."

The coast of South America was coming into sight when the pilot began to prepare for landing on the Inner Station. (I know



I grubbed the couch just in time to stop myself from zooming to the ceiling. "I p" and "down" had vanished completely.

"landing" sounds peculiar, but it's the expression used.) I was still staring out of the little porthole when I was told to go back to my seat, for the final maneuvers.

The TV screen was now a black rectangle, with a tiny double star shining near its center. We were about a hundred miles from the station, slowly overhauling it. When only a few miles away, we started to put on the brakes. There was a high-pitched whistling from the steering jets, and for a moment a feeble sensation of weight returned. It lasted only a few seconds; then we had matched speeds and joined the station's satellites.

My first impression of the Inner Station was one of complete chaos. Floating there in space was a great open latticework of spidery girders, in the shape of a flat disk. Here and there on its surface were spherical buildings, connected by tubes wide enough for men to travel through. In the center of the disk was the largest sphere of all, dotted with portholes and with antennae jutting in all directions.

Several spaceships, some almost completely dismantled, were attached to the great disk at various points. They looked, I thought, much like flies caught in a spiderweb. Men in space suits were working on them, and sometimes the glare of a welding torch would dazzle my eyes.

Other ships were floating freely, in no particular system, around the station. Some were streamlined, winged vessels like the one that had brought me from earth. Others were true ships of space—assembled here outside the atmosphere and designed to ferry loads from world to world without ever landing on any. They were weird, flimsy structures, usually with a pressurized spherical chamber for the crew and passengers, and larger tanks for the fuel, linked together by thin struts.

I was wondering how we were going to get aboard the station when something came aweeping into my field of vision. It was a cylinder just big enough to hold a man—and it did hold a man, for I could see his head through the plastic panels at one end. Long, jointed arms projected from the machine's body, and it trailed a thin cable behind it. I could just make out the faint jet of the tiny rocket motor which propelled this mini-ature spaceship.

The operator must have seen me staring at him, for he grinned back as he flashed by. A minute later there came an alarming "clang" from the hull of our ship. The pilot laughed at my fright.

"That's only the towing cable being coupled. It's magnetic, you know. We'll start to move in a minute"

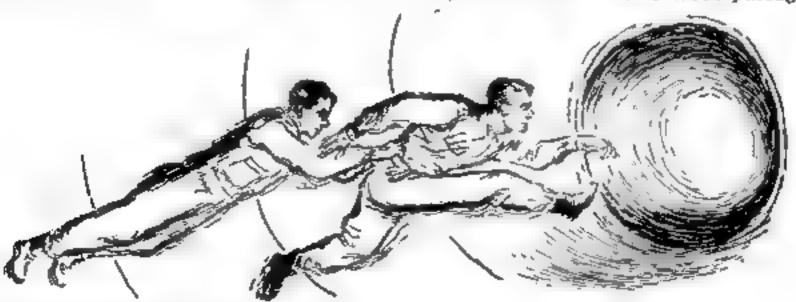
There was the feeblest of tugs, and our ship slowly rotated until it was parallel to the great disk of the station. The cable had been attached amidships, and we were being hauled in like a fish on a line.

Soon there was a series of bangings and scrapings from the air lock, followed by an alarming hiss of air. It slowly died away, and presently, with a soft sucking noise, the inner door of the pressure chamber swung open.

"Remember about moving slowly," said the pilot, gathering up his log book. "The best thing is to hitch on to my belt and I'll tow you. Ready?"

It wasn't very dignified. But it was safest to take no risks, so that was the way I traveled through the flexible, pressurized coupling clamped on to the side of our ship. The pilot launched himself with a powerful kick and I trailed along behind him, with a firm grip on his belt.

Presently we emerged into a wide metal tunnel, one of the station's main passage-



The pilot launched himself with a powerful kick, and I trailed along behind him through the flexible, pressurized coupling clamped to our ship.

ways, I guessed. Cables and pipes ran along the walls, and at intervals we passed through great double doors with red EMERGENCY notices on them.

"I'm taking you to Commander Doyle," the pilot explained. "He's in charge of training and will be keeping an eye on you."

"What sort of man is be?" I saked.

"You'll find out soon.

Here we are."

We drifted to a halt in front of a circular door carrying the notice: "Cdr. R. Doyle, i/c Training. Knock and Enter." The pilot did both, still towing me,

I heard him say: "Captain Jones reporting, Mr. Doyle-with passenger." Then he shoved me in front and I saw the man addressed.

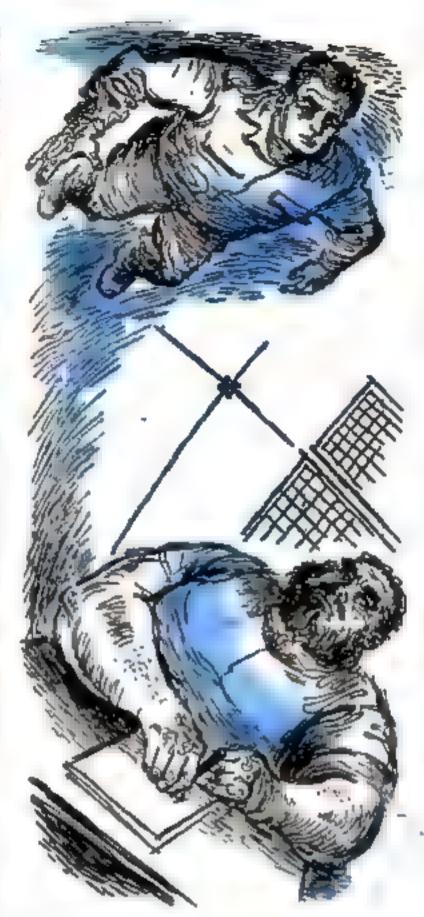
He was sitting at an ordinary office desk, which was rather surprising in this place where nothing clae seemed normal. And he looked like a prize fighter. Two huge arms covered most of the desk before him.

When he looked up,

I found myself staring at a huge red beard and two enormous eyebrows. Commander Doyle wasn't a handsome man. But he was certainly a striking one, and my hig surprise was still to come.

"So you're Roy Malcolm, eh?" he said, in a pleasant voice. "O.K., Captain Jones-I'll take charge of him now."

The pilot saluted and glided away. For the next ten minutes Commander Doyle questioned me closely, building up a picture of my life and interests. When he had finished writing this down, he drummed thoughtfully on the desk with his huge fingers. I was feeling a bit scared, and to make



By the time Commender Doyle had finished, I'd drifted eway from the floor and was floating helplessly in mid-air again.

matters worse I'd drifted away from the floor and was floating helplessly in mid-air again. The commander gave a chuckle.

"Afternoon classes have just stopped," he said. "I'll take you to meet the boys." Then he grabbed a long metal tube that must have been along underneath the deak, and launched himself out of his chair with a single jerk of his huge left arm.

He moved so quickly that it took me completely by surprise. A moment later I just managed to stifle a gasp of amazement. For as he moved clear of the deak, I saw that Commander Doyle had no legs.

It was a long time before I discovered what had happened to him. The accident occurred when he was on the first expedition to Mercury. It was obvious why he had come to the station: it was the only place he wouldn't be a cripple. Indeed, thanks to his powerfully developed arms, he was probably the most agile men in the station. He had lived here for ten

years and would never return to earth, where he would be helpless again.

MY FIRST day on the Space Station, I had to learn how to live all over again. I couldn't judge the effort needed to make any movement. Although weight had vanished, momentum remained. It required force to start something moving, and more force to stop it again. That was where the broomsticks came in.

They consisted of one hollow tube sliding inside another. The two were connected by a powerful spring, one tube ending in a hook, the other in a wide rubber pad. If you wanted

to move, you put the pad against the nearest wall and shoved. The recoil launched you into space, and when you arrived at your destination you let the spring absorb your velocity and so bring you to rest. Trying to stop yourself with your bare hands was liable to result in sprained wrists.

There were about a hundred people on board the Inner Station, ten of them apprentices. The senior apprentice was a tail, quiet Canadian named Tim Benton. It was Tim who taught me my way around the Inner Station.

"I suppose you know what we do up here?" he said when the commander had left us.

"You refuel spaceships out from earth, and carry out repairs and overhauls."

"Yes, that's our main job. The stations farther out have many other duties, but we needn't bother about that now. There's one important point I'd better make clear right away. This Inner Station is really in two parts, with a couple of miles between them. Come look."

He pulled me over to a port and I stared out. Hanging there, so close that it seemed I could touch it, was what looked like a giant flywheel. It was slowly turning on its axis, and as it revolved I could see the glitter of sunlight on its observation ports. I could not help comparing its smooth compactness with the flimsy, open girder work of the station in which I was. The great wheel had an axie, for jutting from its center was a long, narrow cylinder which ended in a curious structure I couldn't understand.

"That's the Residential Station," said Benton disapprovingly. "It's nothing but a hotel. Because it's spinning, it's got normal earth gravity at the rim. It wouldn't be safe for passengers from Mars and the moon to go straight to earth after living in a much lower gravity field. They're transshipped to the Residential Station to get acclimatized. They go in at the center, where there's no gravity, and work slowly out to the rim, where it's earth normal."

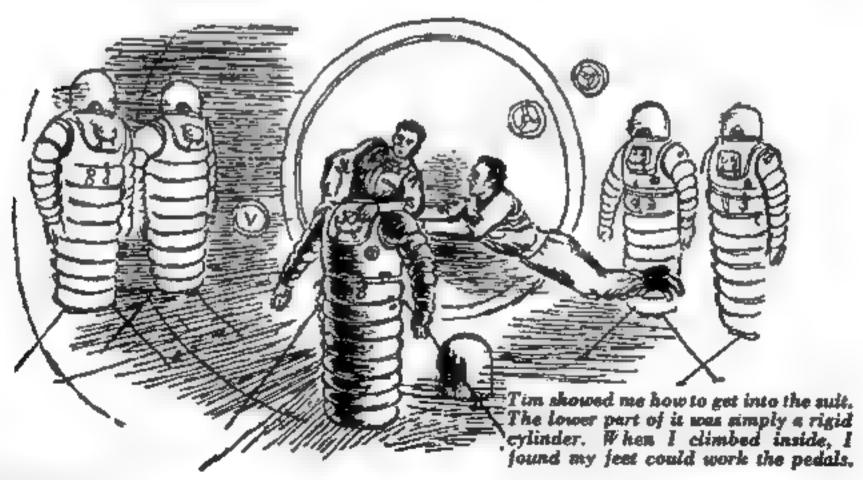
"How do they get aboard if it's spinning?"
"See that ship moving into position? If
you look carefully, you'll see that the axle
of the station isn't spinning; it's driven by a
motor against the station's spin so that it
actually stands still. The ship can couple to
it and transfer passengers. The coupling's
free to rotate, and once the axle revs up with
the station, the passengers can go aboard."

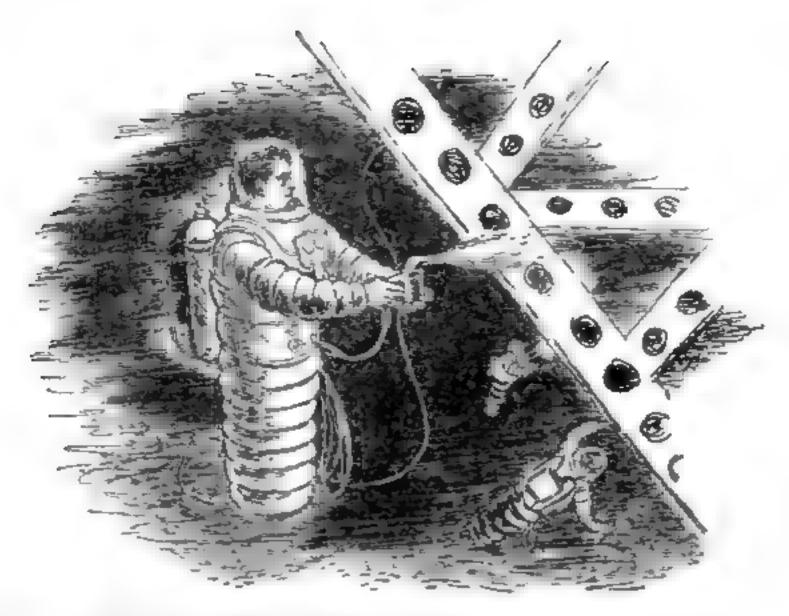
"Will I have a chance to go there?"

"I expect it could be arranged—though I don't see much point in it. You might just as well be down on earth."

It must have been quite a bother showing me around, because I had to be pushed or pulled most of the way until I'd found my "space legs." Once or twice Tim just managed to rescue me when I'd launched myself too vigorously and was about to plunge headlong into an obstacle.

It was several days before I really knew my way around the maze of corridors and pressure chambers that was the Inner Station. In that first trip I merely had a quick survey of its workshops, radio equipment, power plant, sur-conditioning gear, storage





A spaceship with plating stripped off was secured by cords that wouldn't support a man on earth. Several mechanics wearing suits like our own were working on the hull.

tanks and observatory. Sometimes it was hard to believe that all this had been carried into space and assembled here five hundred miles above the earth. I didn't know, until Tim mentioned it, that most of the material had actually come from the moon. Its low gravity made it more economical to ship equipment from there instead of from earth, even though earth was closer.

My first tour ended inside one of the air locks. We stood in front of a great circular door, resting snugly on rubber gaskets, which led into outer emptiness. Clamped to the walls were space suits.

"Do you think I'll have a chance of trying one while I'm here?" I asked.

Tim looked thoughtful; then he glanced at his watch.

"I'm not on duty for half an hour, and I want to get something I left out at the rim. We'll go outside."

"But . . ." I gulped. "Doesn't it take a lot of training to use one of these?"

Tim answered my question while he was showing me how to get into the suit.

"Of course it takes a lot of training before you can operate one. I'm not going to let you try. You sit tight inside and tag along with me." To most people, the word "space suit" conjures up something like a diving dress, in which a man can walk and use his arms. Such suits are used on places like the moon. But on a space station legs aren't much use anyway, because outside you have to blow yourself around with tiny rocket units.

For this reason, the lower part of the suit was simply a rigid cylinder. When I climbed inside it, I found that my feet could work control pedals. A transparent dome gave me good visibility. Just below my chin there was a tiny keyboard and a few meters. To handle anything outside, there were flexible sleeves through which I could push my arms. They ended in gloves which enabled one to carry out quite delicate operations.

The threw some switches on my suit and clamped the dome over my head. I felt like being inside a coffin with a view. Then he chose his suit and attached it to mine by a thin nylon cord.

The inner door of the air lock thudded shut behind us. I could hear the vibration of pumps as the air was sucked back into the station. My sleeves began to stiffen slightly. Tim called to me, his voice distorted by our belinets.

"I won't switch on the radio yet. You

should still hear me. Listen to this." Then he went into the familiar routine: "Testing, One, Two, Three, Four, Five . . ."

Around "Five" his voice began to fade. When he'd reached "Nine" I couldn't hear a thing. There was no longer enough air around us to carry sound. The silence was uncanny. I was relieved when talk came through my suit speaker.

"I'm opening the outer door now. Don't move-I'll do all that's necessary."

In cerie silence, the great door slowly opened inward. I was floating freely now, and felt a faint tug as the last traces of air puffed out into space. A circle of stars was ahead of me. I could just glimpse the misty rim of earth.

"Ready?" asked Tim.

"O.K.," I said, hoping that the microphone wouldn't betray my nervousness.

The tow line gave a tug as Tim switched on his jets, and we drifted out of the air lock. It was a terrifying sensation. Reason told me I was perfectly safe, but all instinct shouted, "You've a five-hundred-mile fall straight down beneath you!"

We were in sunlight at the moment, passing across Africa, and I could see Lake Victoria and the great forests of the Congo. Though it was fascinating to look at earth, it made me dissy, so I swiveled round in my suit to concentrate on the station. Tim had now towed us well clear of it, almost into the halo of floating ships.

A spaceship with most of its plating stripped off was secured from drifting away by a couple of cords that would hardly have supported a man on earth. Several mechanics wearing suits like our own were working on the hull.

"I'll leave you here a minute," said Tim, clipping my tow line to the nearest girder. "Don't do anything until I get back."

I felt rather foolish, floating like a captive balloon, and was glad no one took any notice of me. Suddenly it began to grow dark. Until this moment, the station and the ships beside it had been bathed in brilliant light from a sun so fierce that I had not dared to look anywhere near it. But now the sun was passing behind the earth as we hurtled across the night side of the planet. I turned to a sight so splendid that it took my breath away.

Earth was a huge, black disk eclipsing the stars, but all along one edge was a glorious crescent of golden light, shrinking even as I watched. The men around me took not the slightest notice of it. The station circled the earth so swiftly that sunset occurred every hundred minutes.

It was not completely dark, for the moon was half full, looking no brighter or closer than from earth. The sky was so crowded with stars, all shining without twinkling, that I wondered how anyone could ever have spoken of the "blackness" of space.

I was so busy looking for the other planets (and failing to find them) that I never noticed Tim's return until my towrope began to tug.

THE apprentices didn't spend all their time aboard Space Station One. Not far from it was a floating graveyard of ships that had been withdrawn from service. Most of them had been stripped of their instruments and were no more than skeletons. Among these derelicts were some great pioneers—the first ship to land on Venus, the first to reach the satellites of Jupiter, the first to circle Saturn. At the end of their long voyages home, they had entered the five-hundred-mile orbit round earth and ferry rockets had taken off their crews. Then they had been retired here, never to be used again.

All, that is, except the Morning Star. She had made the first circumnavigation of Venus, in 1985. But very few people knew that she was still in excellent repair, for the apprentices had adopted her and got her into working condition again.

Commander Doyle knew all about this and approved of it. After all, it was good training. Sometimes he came over to the Morning Star, but it was generally understood that the ship was private property. You had to have an invitation to get aboard. Not until I'd been around for some days, did I get to the ship.

It was the longest journey I had made outside the station, for the graveyard was five miles away, in the same orbit as the station but a little ahead of it. The curious vehicle in which we made the trip had been constructed of junk and was really nothing but a pressurized cylinder, large enough to hold a dozen people. A low-powered rocket unit had been bolted to one end, there were auxiliary steering jets, a simple air lock, a radio—and that was all. This peculiar vessel could hop across to the Morning Star in ten minutes, being capable of a top speed of about thirty miles an hour.

Christened The Skylark of Space, she was

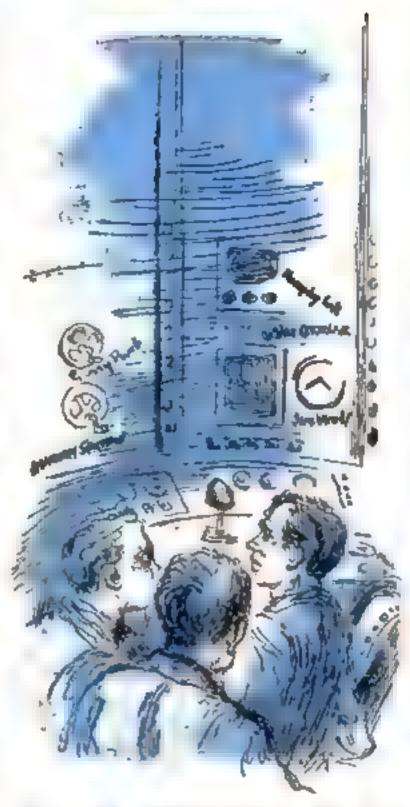
usually kept at the outer rim of the station,
out of the way. When
she was needed, a
couple of apprentices
would go out in space
suits, loosen her mooring lines, and tow her
to the nearest air lock.
Then you could go
aboard through a coupling tube, just as if
you were entering a real
space liner.

The Skylark looked so remshackle that I expected her to fall to pieces any moment, though in fact she had an adequate margin of safety. With ten aboard, her little cabin was crowded, and when the rocket motor started up. the gentle acceleration made us all drift slowly toward the rear. The thrust was so feeble that it made me weigh only about a pound, quite a contrast to the take-off from earth. After a minute or so we shut off the drive and drifted another ten minutes, by which time a brief burst brought us to our destination.

There was plenty of room inside the Morning Star; after all, she had been the home of five men for almost two years. Their names were still there, scratched on the paint in the control cabin, and those signatures took my imagination back almost a hundred years, to the pioneering days of space flight.

DESPITE the ship's age, everything in the control room seemed almost new. The instrument board might have belonged to a craft of my own time. Tim Benton stroked the panel gently. "As good as new!" he said, with obvious pride. "I'd guarantee to take you to Venus any day!" But nobody dreamed the ship would soon have to prove itself.

In my prowling around the station, I had soon visited just about every part that



The names of those five men who had circumnavigated Venus in 1985 were scratched on the control panel. They took me back to the early days of space flight.

The forbidden territory included the radioactive power plant, the Stores Section and the main control room. This was one place I badly wanted to go; it was the "brain" of the station, from which radio contact was maintained with all ships in this section of space, and with earth itself.

One of the tasks of junior apprentices was to take coffee and refreshments to the duty officer in the middle of his watch. This always occurred when the station was crossing the Greenwich Meridian. Since it took exactly a hundred minutes to make one trip around earth, everything was based on this interval and our clocks timed a local "hour" of this length. After a while one judged the time by glancing at the earth and seeing what continent was beneath.

The coffee, like all drinks, was carried in closed containers and

had to be drunk by sucking through a tube, since it wouldn't pour in the absence of gravity. The refreshments were taken up to the control room in a light frame with holes for the containers, and their arrival was always much appreciated by the staff on duty.

It took a lot of persuading before I got this job. I pointed out that it relieved the others for more important work; to which Tim retorted that it was one of the few jobs they liked. But at last he gave in.

I'd been carefully briefed, and just as the station was passing over the Gulf of Guinea I stood outside the control room and tinkled my little bell. (There were a lot of quaint customs like this.) The duty officer shouted, "Come in!" I steered my tray through the door and handed out the food and drinks.

Besides the duty officer and his assistant, there were several radio operators, and other men working on equipment I couldn't recognize. Dials and TV screens were everywhere, lights were flashing, yet the whole place was silent. The men sitting at their little deaks were wearing headphones and throat microphones, so that any two people could talk without disturbing others.

The duty officer sat at a huge glasstopped deak on which glowed a complicated pattern of colored lights. It showed the earth, the orbits of the other stations and the courses of all ships in our part of space. From time to time he would say something and I knew that some order was winging its way to an approaching ship.

One of the assistants was kind enough to show me around. He let me listen to some of the radio conversations, and explained the workings of the great display panel. The thing that impressed me most of all, however, was a shining cylinder, covered with controls and winking lights, in the center of the room.

. "This," said my guide proudly, is HAVOC."

"What?" I asked.

"Short for Automatic Voyage Orbit Computer."

"What does the H stand for?"

"Everyone asks that. It doesn't stand for anything." He turned to the operator. "What's she set up for now?"

The answer was mostly in mathematics, but I did catch the word "Venus."

"Right, Suppose we wanted to leave for Venus in four hours . . ."

His hands flicked a keyboard like that of an overgrown typewriter. A few lights changed color. Then after about ten seconds, a buzzer sounded and a tape slid out of a slot. It was covered with closely printed figures.

"There you are," said my guide. "Direction of firing, elements of orbit, time of flight, when to start braking. All you need is a spaceship!"

Our space station, only five hundred miles up, was the nearest to the earth; there were others at much greater distances. The purpose of the Inner Station was to act as a refueling, repair and transfer point for spaceships. For this it was necessary to be as close to the earth as possible.

The Meteorological Stations, on the other hand, had to be a fair distance out to "see" as much of the earth as possible. There were two of them, six thousand miles up, circling the world every six and a half hours over the Equator. Though they could see much farther north and south than we could, the polar regions were still out of sight or badly distorted. Hence the Polar Met Station which, unlike all others, had an orbit passing over the poles.

Beyond the Met Stations, fifteen thousand miles up, circled the biology labs and the famous Space Hospital. There research into sero-gravity conditions was carried out, and many diseases incurable on earth could be treated. For example, the heart no longer had to work so hard and could be rested in a manner impossible on earth.

Finally, twenty-two thousand miles out, were the three great Relay Stations. They took exactly a day to make one revolution; therefore they appeared to be fixed forever over the same spots on the earth. Linked by tight beams, they provided TV, long-distance radio and 'phone coverage over the whole planet.

One station, serving the Americas, was in Latitude 90° West. A second, in 30° East, covered Europe and Africa. The third, in 150° East, served the entire Pacific area. There was no spot on earth where you could not pick up one of the stations.

The different orbits were connected by a shuttle service of small rockets which made trips at infrequent intervals. On the whole, however, there was little traffic between the stations. Most of their business was done directly with earth.

I WAS in the Morning Star watching Ronnie Jordan work on a model spaceship when the radio called. It was Tim Benton, on duty at the station. He sounded very excited.

"Is that Ron? Anyone else there-only Roy? Well, listen to this, it's very important. We want to use the Morning Star. I've promised the commander that she'll be ready in three hours."

"What!" gasped Ronnie. "I don't believe it!"

"There's no time to argue—I'll explain later. The others are coming over right away. Make a list of these points and start checking."

For the next twenty minutes we were busy testing the controls. Presently there was a bumping and banging from the air lock and three of our colleagues came aboard, towing batteries and tools. From them we discovered what all the fuss was about.

One passenger from a Mars-Earth liner, which had just docked at the Residential Station, was seriously ill and had to have an operation within ten hours. The only chance of saving his life was to get him to the Space Hospital, but all the ships at the Inner Station were being serviced and it would take a day to get one spaceworthy.

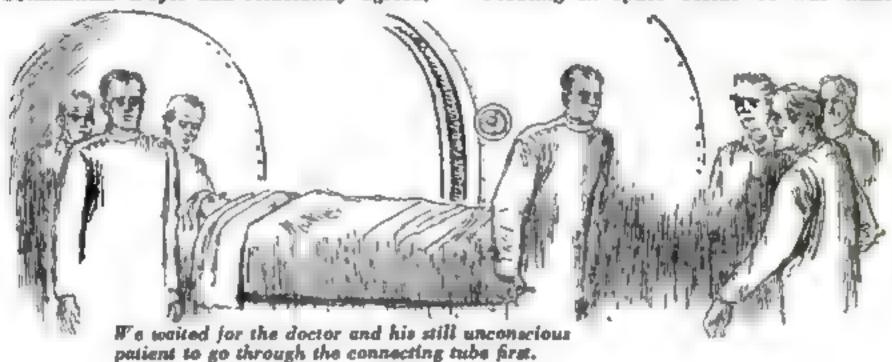
It was Tim who'd talked the commander into giving us this chance. The Morning Star, he had pointed out, was fully up to a trip to the Space Hospital. It wouldn't even be necessary to use the main motors. The journey could be made on auxiliary rockets.

Since he could think of no alternative, Commandar Doyle had reluctantly agreed, Japan and New Zealand appeared over opposite horizons.

And still the earth dwindled behind us. Now it was a sphere at last, small enough for the eye to take in at one glance.

We were fifteen thousand miles above the earth, swimming into the path of the Space Hospital. Once again weight returned with the roaring rockets. There was one prolonged burst, then a series of short corrections. When it was all over, Commander Doyle unstrapped himself from the pilot's seat and drifted over to the observation port. His instruments told him where he was far more accurately than his eyes could, but he wanted the satisfaction of seeing for himself. I also made for a port.

Floating in space beside us was what



on certain conditions. We had to get the ship over to the station under her own power to be fueled up—and he would do all the piloting.

And so the Morning Star began her first voyage in almost a hundred years. It was not much of a journey, compared with her great trip to Venus. Yet to us it was a real adventure.

Our crew consisted of Tim Benton, Norman Powell, Ronnie Jordan, and me. The sick man was strapped to a stretcher against one wall; with him was a doctor who did nothing except look anxiously at his watch and give his patient an injection from time to time.

There was nothing to do while the Morning Star swept outward on the long curve that would bring her to the Space Hospital. Very slowly, earth was receding behind us. It no longer filled almost half the sky. Already we could see far more of its surface than was possible from the Inner Station. Northward, the Mediterranean crept into view; then

seemed to be a great crystal flower, its face turned toward the sun. At first I could not judge its true scale or how far away it was. Then, through the transparent walls, I could see little figures moving around. The station must be at least five hundred feet in diameter.

As we slowly drifted closer, I could see people gathering in the observation decks and glass-roofed wards to watch our arrival. For the first time, it occured to me that this flight of the Morning Star really was an event. All radio and TV networks would be covering it. As a news story, it had everything—a race for life and a gallant effort by a long-retired ship.

The rocket tractors came fussing up to us and towropes started to haul us in. A few minutes later the air looks clamped together. We waited for the doctor and his still unconscious patient to go through the connecting tube first, then went to meet the crowd waiting to welcome us.

Hospitals are usually rather depressing



After a rapid conference with the unhappy pilot, Commander Doyle ordered: "Get me the nearest Relay Station. I'm taking over."

places, but this one was different. Few of the patients were seriously ili, though down on earth most of them would have been dead or disabled, owing to the effect of gravity on their weakened hearts. Many were eventually able to return to earth, others could live only on the moon or Mars, and the severest cases had to remain permanently on the station. The hospital was a huge place, ablase with sunshine, and had almost everything that could be found on earth—everything, that is, that did not depend on gravity.

It seemed we would have to wait two days before we could go back to the Inner Station, because there was no earthbound ship until then. Of course, we could have made the return trip in the Morning Star, but Commander Doyle vetoed this.

"I don't mind tempting providence once," he said, "but before the old lady makes another trip, she's going to be overhauled and the motors tested. Combustion-chamber temperature was starting to rise unpleasantly on our final approach."

Before the ferry rocket arrived to take us home, we had the satisfaction of knowing that our mission had been successful. The patient was off the danger list, and had a good chance of complete recovery.

THE ferry rocket had been diverted from its normal run between the Observatory Stations. Its control cabin was much like that of any other spaceship, but from the outside the vessel looked peculiar. It had been built in space and, of course, had no

etreamlining or fins. The cabin was roughly egg-shaped, and connected by three open girders to the fuel tank and rocket motors. Most freight was not taken inside, but simply lashed to what were appropriately called "luggage racks," a series of wire-mesh nets on struts. For stores that had to be kept under normal pressure, there was a small hold with a second air lock just behind the control cabin.

I was watching the pilot's fingers flying across the position-finding calculator key-board, when suddenly he froze over his deak. Very carefully, he pecked at the keys to set up his calculations again. An answer came up, and the pilot stared as if unable to believe it. Then he loosened himself from the seat straps and moved to the nearest observation port.

I was the only one who noticed. There was another port near me and I headed for it. Out there in space was the earth, toward which we were slowly falling.

Then an icy band seemed to grip my chest and I stopped breathing. By this time, I knew, earth should be appreciably larger as we dropped in from the orbit of the hospital. Yet unless my eyes deceived me, it was smaller than I had last seen it.

I looked again at the pilot, and his face confirmed my fears.

We were heading out into space.

"Commander Doyle," said the pilot. "Will you come here a minute?" The commander left his bunk and headed for the control desk. There was a rapid conference with the unhappy pilot; then the commander ordered: "Get me the nearest Relay Station. I'm taking over."

It was a quarter of an hour before anyone explained things to me, a quarter of an hour of furious activity, radio calls, and lightning calculations. Then Norman Powell took pity on my ignorance.

"This ship's got a curse on it," he said in disgust. "The pilot made the one navigation error you'd think impossible. He should have cut our speed by point nine miles a second. Instead, he applied power in exactly the wrong direction and we've gained speed by that amount. So instead of falling earthward, we're heading out into space."

It was one of those things, like landing an aircraft with wheels up, that lan't as difficult to do as it sounds. Aboard a space-ship in free orbit, there's no telling in which direction and at what speed you're moving. Everything is done by instruments and

calculations, and if a minus sign is taken for a plus, it's easy to point the ship exactly the wrong way before applying power.

Of course, one is supposed to make other checks to prevent such mistakes. Somehow they hadn't worked this time or the pilot hadn't applied them.

The extra speed we'd been given was enough to put us into an escape orbit. In other words, we were traveling so fast that the earth could never pull us back. We wouldn't know our exact path until HAVOC worked it out for us. Commander Doyle had radioed our position and velocity. We had to wait for instructions.

The situation was serious, but not hopeless. We still had considerable fuel—the reserve intended for the approach to the Inner Station. If we used it now, we could at least prevent ourselves flying away from earth, but we should then be traveling in a new orbit that might not take us anywhere near a space station. Whatever happened, we had to get fresh fuel as quickly as possible. The short-range ferry wasn't designed for long excursions and carried only a limited

oxygen supply, enough for about a hundred hours. If help couldn't reach us by that time, it would be just too bad.

We had to wait nearly fifteen minutes before the computing staff on the Inner Station worked out our new orbit and radioed it back to us. Commander Doyle plotted our path while we watched.

"We're heading for the moon," he said, tracing with his finger. "We'll pass its orbit in about forty hours, near enough for its gravitational field to have quite an effect. With some rocket braking, we can let it capture us."

"Wouldn't that be a good idea?"
The commander subbed his chin.

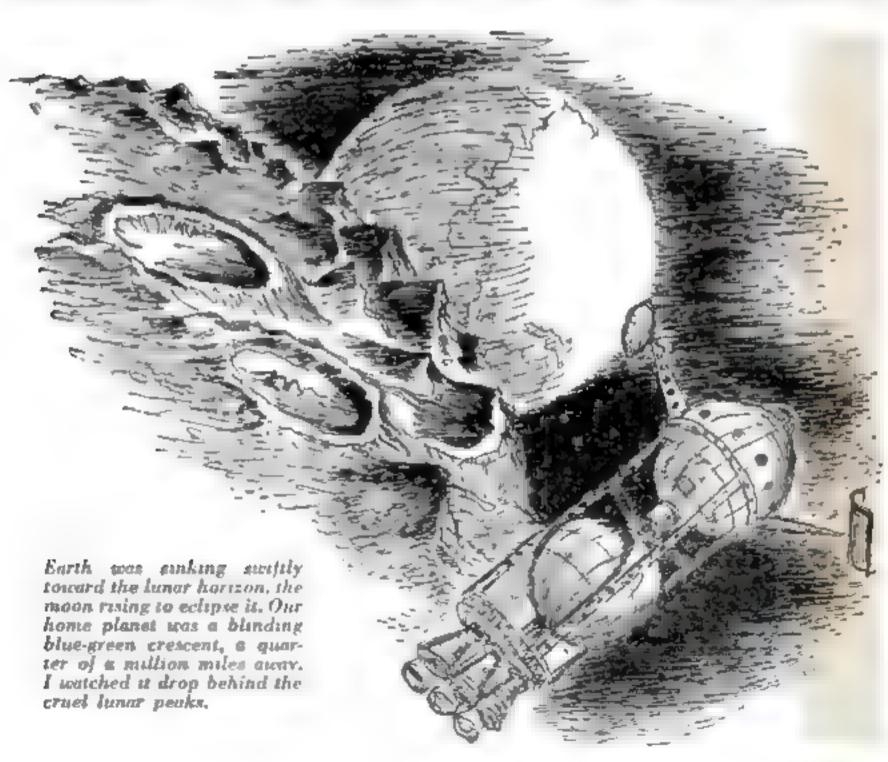
"I don't know," he said. "It depends on whether there are any ships on the moon that can come up to us."

"Can't we land on the moon ourselves, near one of the settlements?" asked Norman.

"No. We've not enough fuel, and the motors aren't powerful enough, anyway."

The cabin was filled with silence.

"The trouble is," said the commander at last, "that it's going to cost a fortune to get



a ship up from the moon, just to match our speed and transfer a few tons of fuel. That's the obvious, brute-force answer."

The pilot's dejected face lit up.

"I've got it!" he said. "What's wrong with the launcher down in Hipparchus? That should be able to shoot us up some fuel."

The conversation grew animated and technical, and I was rapidly left behind. Ten minutes later some satisfactory conclusion had been reached. When all the radio calls had been made, I got Tim into a corner and threatened to keep bothering him until he explained what was going on.

"Surely, Roy," he said, "you know about the Hipparchus leuncher?"

"That magnetic thing that shoots fuel tanks up to rockets orbiting the moon?"

"Of course. It's an electromagnetic track about five miles long, running east and west across the crater Hipparchus. Ships to be refueled get into an orbit round the moon, and at the right time the containers are shot up into the same orbit. The ship's got to do a bit of maneuvering to 'home' on the tank, but it's much cheaper than doing the whole job by rockets."

"What happens to the empty tanks?"

"That depends on the launching speed. Sometimes they crash back on the moon; there's plenty of room there. But usually they're given lunar escape velocity, so they just get lost in space."

"I see. We're going near enough to the moon for a fuel tank to be shot to us."

"Yen; they're doing the calculations now, Our orbit will pass behind the moon, about five thousand miles above the surface. They'll match our speed as accurately as they can with the launcher, and we'll have to so the rest under our own power."

and when will all this happen?"

n about forty hours."

mour by hour earth dwindled and the moon grew larger in the sky abead. There was very little to do, apart from instrument checks and regular calls to the space stations and lunar base. Most of the time was spent sleeping and playing cards.

Though I had often watched the moon through telescopes from earth and from the Inner Station, it was very different to see the great plains and mountains with unaided eyes. We were so close that all the larger craters were visible along the band dividing night from day. The line of sunrise had just passed the center of the disk, and it was early dawn down there in Hipparchus,

where they were preparing for our rescue. Through the ship's telescope I peered down into the great crater.

The sunlight was slanting over its ruined walls, casting mile-long pools of inky shadow. Here and there upthrust peaks caught the first light of dawn and blazed like beacons in the darkness around them.

There were other lights in the crater shadows, arranged in tiny, geometric patterns. I was looking down on a lunar settlement. Now hidden in darkness were the great chemical plants, the pressurized domes, the spaceports and the power stations that drove the launching track. In a few hours they would be visible as the sun rose above the mountains, but by then we should have passed behind the moon and this side would be hidden from us.

And then I saw it, a thin bar of light stretching in a dead straight line across the darkened plain. I was looking at the flood-lights of the launching track, ranged like lamps along an arterial road. The fuel tank would be waiting at the head of the track. If it had been daylight down there, I could have seen the actual launch. There would have been a tiny speck racing along the track, more and more swiftly as the generators poured their power into the magnets. It would leave the end of the launcher at over five thousand miles an hour, too fast for the moon ever to pull it back, and would sweep out into space to meet us.

Then the ship passed behind the moon, and I saw with my own eyes the land that had remained hidden from human sight until the coming of the rocket. It was, of course, much like the visible face.

I HAD almost forgotten earth when Tim drew my attention to it again. It was sinking swiftly toward the lunar horizon: the moon was rising to eclipse it as we swept along in our great arc. A blinding blue-green crescent, the South Polar cap almost too brilliant to look upon, the reflection of the sun forming a pool of fire in the Pacific Ocean—that was our home, now a quarter of a million miles away. I watched it drop behind the cruel lunar peaks until only the faint, misty rim was visible; then even this disappeared.

The fuel container was already on its way and on the correct orbit. The moon's gravitational field would curve its path and we would pass within a few hundred miles of it. Our job then was to match speeds by careful use of our remaining fuel, and when we had coupled up to the tank, pump across its contents.

"But just suppose," I said anxiously to Norman Powell, "that they score a direct hit on us! After all, the whole thing's rather like shooting a gun at a target. And we're the target."

Norman laughed.

"It'll be moving very slowly when it comes up to us, and we'll spot it in our radar. So there's no danger of a collision.

By the time it is really close, we'll have matched speeds and if we bump it'll be like two snowflakes meeting head on."

We picked up the signals from the fuel container when it was still a thousand miles away, thanks to its tiny radio beacon. After this I kept out of the way while Commander Doyle and the pilot

made our rendervous in space. It was a delicate operation, jockeying a ship until it matched the course of the still-invisible projectile. Our fuel reserves were too slim to permit any more mistakes. Everyone breathed a sigh of relief when the stubby, shining cylinder was beside us.

The transfer took only about ten minutes. As our pumps finished their work the earth emerged from behind the moon's shield. It seemed a good omen. We were masters of the situation and in sight of home again.

I was watching the radar screen when we turned on the motors again. The bright spot representing the empty fuel container drifted slowly to the edge of the screen. It was the only object near enough to produce a radar echo in the thousand-mile-diameter globe swept by our beams.

About to switch off the radar screen, I saw a faint spark of light at extreme range. It vanished as our beam moved into another sector of space, and I waited until it had swept through the complete cycle, wondering if I'd been mistaken. But the spark reappeared in the same position. I stopped the beam sweep so that it locked on the distant echo. It was just under five hundred miles away, moving very slowly. Then I called Tim, on the chance that it was a large meteor.

The thought I'd picked up our discarded fuel container again. But he soon saw that it was in a different part of the sky, and his skepticism vanished.

"It must be a spaceship," he said. "If it is, it'll be carrying a radio beacon."

He turned our receiver to the beacon frequency, but without result. Norman now joined us, looking over Tim's shoulder.

"If it's a meteor," he said, "let's hope it's a nice lump of platinum. Then we can retire for life."

> "Don't worry," said of Tim, "no one's ever found anything except iron in meteors."

"How big would it have to be to produce a radar echo this bright?" I saked.

"You can't tell," said Tim. "A spaceship could produce a signal as small as that, if seen end on."

"I think I have it," said Norman auddenly.

"And it isn't a meteor. You look."

He had been searching with the telescope, and I took his place. Against a background of faint stars a roughly cylindrical object, lit by sunlight, was slowly revolving. It was streamlined and had a pointed nose, more like an old-time artillery shell than a modern rocket.

Commander Doyle stared through the telescope for a long time after we called him. Finally he remarked: "Whatever it is, we'd better look at it and make a report."

Our ship spun round in space as we began the course correction. The rockets fired for a few seconds, our new path was rechecked, and after several shorter bursts, we began to edge toward the mysterious object under the steering jets alone. Meanwhile it was impossible to use the telescope, so when I next saw my discovery it was only a hundred yards beyond our port.

It was a rocket of some kind. Since it was only about ten feet long, it might be one of the automatic reconnaissance missiles sent out in the early days of space-flight. Commander Doyle didn't think so, because as far as he knew they'd all been accounted for, and it had none of the radio and TV equipment such missiles carry.

It was painted a very bright red, an odd color, I thought, for anything in space.



Then the pattern glimpsed before moon back into view. Clearly painted on the mussile was the skull and crossbones.

There was some lettering on the side but we couldn't make out the words at this distance. As the projectile slowly revolved, a black pattern on a white background came into view, but went out of sight before I could interpret it.

"I don't like its looks," Tim Benton said.

"Red's the sign of danger."

"Don't be an old woman," scoffed Norman, "If it was a bomb, it certainly wouldn't advertise the fact."

Then, with the thing less than fifty feet away, the pattern I'd glimpsed before swam back into view.

Clearly painted on the slowly approaching missile was the symbol of death—the skull and crossbones.

Commander Doyle must have seen that ominous warning as quickly as we did, for an instant later our rockets thundered briefly. The crimson missile started to recede once more into space. At its closest approach, I had read the words below the skull and crossbones:

## WARNING! RADIOACTIVE WASTE! ATOMIC ENERGY COMMISSION

"Wish we had a Geiger counter," said the commander thoughtfully. "Still, by this time it can't be very dangerous. But we'll all have a blood count when we get back."

"How long do you think it's been up here, sir?" asked Norman. "Not this one. But it will be when we report it. Good work, Malcolm!"

I was pleased at the compliment, but still a bit worried that we'd received a dangerous dose of radiation. Luckily my fears proved groundless.

We discovered, a good while later, the history of this stray missile. The Atomic Energy Commission finally admitted the dispatch of a waste container in 1981 that had been intended to crash on the moon but missed. Astronomers had a lot of fun working out how the thing got into its orbit.

DESPITE this incident, we were only a few minutes behind schedule when we swept into the orbit of Relay Station Two, the one over the middle of Africa. It consisted of a flat, rectangular latticework, with one side facing the earth. Covering this face were hundreds of small, concave reflectors that beamed radio signals to the planet beneath, or collected them on the way up.

We cautiously approached the back of the station. A pilot who let his ship pass in front of it was very unpopular, as he might cause a temporary failure on thousands of circuits, while blocking the radio beams. For the whole of the planet's long-distance services and most radio and TV networks were routed through the Relay Stations. As I looked more closely, I saw that there were two other sets of radio reflector systems, aimed not at earth but sixty degrees both ways from it. These were handling the



The great revolving drum of the Residential Station slowly expanded about as Tim maneuvered the Skylark closer.

"They started getting rid of dangerous waste this way in the 1970's. Nowsdays we know how to deal with by-products of the atomic piles, but then there were a lot of isotopes they couldn't handle. Rather a drastic way of getting rid of them!"

"Twe heard about these waste containers," said Tim, "but I thought they'd all been

collected."

beams to the other two stations.

We spent only twelve hours at the Relay Station, while our ship was overhauled and reprovisioned. The living arrangements were much the same as on the Inner Station.

We did get a brief glimpse of the main switch room. There were acres of dials and colored lights. Soft voices, in every language, came through the loudspeaker. We saw football games, string quartets, air races, ice hockey, puppet shows, grand opera—the world's entertainment, all depending on three tiny metal rafts hanging in space.

Not all the Relay Station's business was concerned with earth, by any means. The interplanetary circuits passed through them. If Mars wished to call Venus, it was sometimes convenient to route messages through the earth relays by high-speed telegraphy. Because it takes several minutes for radio waves to bridge the gulf between even the nearest planets, you can't actually talk to someone on another world. (Except the moon—and there you have to put up with an annoying time-lag of three seconds before you get any answer.)

Our trip back to the Inner Station was uneventful and rather tedious. Nothing much had changed. Some ships had gone and others had taken their places. The other apprentices were waiting for us in the air lock. They gave the commander a cheer as he came aboard, but later there was a lot of good-natured kidding about our adventures.

I'd missed the ship that was supposed to take me home. The plan now was to send me over to the Residential Station and put me on the regular ferry, so that I'd be going to earth with passengers homeward bound from Mars or Venus.

I spent most of my last day aboard the station collecting autographs and souvenirs. At last everything was packed. There was one good-bye left to make.

Commander Doyle was sitting at his deak, just as I'd seen him first. I hoped that I'd not been too much of a nuisance and tried to say so. The commander grinned.

"I suppose you realize, Roy, that a good number of young men apply for jobs here and not many get them. The qualifications are too steep. Well, I've kept my eye on you and if, in a couple of years, you want to put your name down, I'll be glad to make a recommendation."

"Why, thenk you, sir!"

The commander propelled himself out of his seat with his left hand, stretching out the right one toward me. As we shook hands, I again recalled our first meeting and suddenly realized that, though I'd seen him every day, I'd almost forgotten that Commander Doyle was legless.

I had a surprise on reaching the air lock. I had assumed that one of the ferry rockets was going to take me to the Residential Station. Instead, there was the ramshackle

Skylark of Space, with Tim Benton and Ronnie Jordan as the crew.

The great revolving drum of the Residential Station slowly expanded ahead of us: the collection of domes and pressure corridors that had been my home for so long dwindled astern. Cautiously Tim brought the Skylark up to the axis of the station. Big jointed arms drew us slowly in until the air locks clamped together.

"Well, so long," said Ron. "We'll be secing you again."

"I hope so," I said, wondering whether to

mention Commander Doyle's offer.

I shook hands with them both, the doors folded back, and I went through into the flying hotel that had been my neighbor for

so many days.

IT WAS late in the "evening" when I arrived aboard the Residential Station. Time here was geared to the cycle of nights and days down on earth. Every twenty-four hours the lights dimmed, a hush descended, and the residents went to bed. The sun might be shining, or in eclipse behind the earth—it made no difference here.

My room was just large enough to holbed, a chair and a washbasin. It was strange to see flowing water again that first thing I did was turn on the tap a watch a pool form in the basin.

That first evening I spent enjoying an experience only gravity could make possible—taking a real bath, in water which didn't try to turn itself into a giant drifting rain-drop.

I didn't sleep well my first night under gravity, even though I weighed only a third of what I'd been accustomed all my life. Breathing was difficult, and I had unpleasant dreams about climbing a steep hill with a load on my back. At last, however, I managed to doze off until a steward woke me for breakfast.

When I had dressed, I started to explore. The first thing to get used to was the fact that the floors were all curved. The reason for this was simple enough. I was on the inside of a giant cylinder that slowly turned on its axis. Centrifugal force, the same force that held the station in the sky, held me to the side of the revolving drum.

If you walked straight ahead, you could go right around the station and come back to where you started. At any point, "up" would be toward the central axis.

The station wasn't a single cylinder, but

three, one inside the other. As you moved out from the center, weight increased. The innermost cylinder was the "One-Third Earth Gravity" floor, and being nearest the air locks was devoted mainly to handling passengers and luggage.

Surrounding this central cylinder was the more spacious "Two-Thirds Earth Gravity" floor. You passed from one floor to the other by elevators or by curiously curved stairways. It was an odd experience, for I was not yet accustomed even to a third of my earth weight. As I walked clowly down the steps, gripping the handrail firmly, I seemed to grow steadily heavier.

There were some small shops on the "Two-Thirds Gravity" deck, and I was exploring these when some Martian colonists came in. One was a fellow about my age.

"Hello," he said, "you weren't on the

"No," I answered. "I've just come over from the other half of the station."

"I'm John Moore," the other said. "It's my first trip to earth."

You were born on Mars?"

That's right. I'm coming home to go to

t sounded strange to hear that phrase oming home" from someone who'd never foot on earth.

For the rest of my short stay in the Residential Station I spent most of my time with John Moore. We had so much to talk about that the hours spent waiting for the ferry passed quickly. Life on Mars was as novel to me as life on earth was to him. John had a fine collection of photographs showing the great pressure-domed cities and colored deserts.

Before you could go down to earth, you were supposed to spend a twelve-hour quarantine period on "Full Earth Gravity" floor—the outermost of the station's three decks. So once again I went down one of those curving stairways, my weight increasing with every step. When I had reached the bottom, my legs felt very weak and wobbly. I could hardly believe that this was the normal force of gravity under which I had passed my whole life.

John had come with me, and felt the strain even more than I did. This was three times the gravity of his native Mars, and twice I had to stop him from falling as he tottered unsteadily about. The third time I failed, and we both went down together. For a while we sat on the thick rubber flooring (the de-

signers of the station had known where it would be needed!) and got up strength for another attempt. This time we didn't full.

There were nearly fifty passengers crowded into the "One-Third Gravity" floor waiting to disembark by the earth ferry. This was the biggest spaceship I had ever been inside. There was one large cabin for the passengers, with seats in which we were supposed to remain atrapped during the trip. We waited nearly an hour before everyone was aboard and the luggage stowed away. Then the loudspeakers told us to stand by for takeoff.

Three sharp notes gave us the last warning. Five seconds later the motors opened up gently, quickly increasing power to full thrust. I saw the Residential Station fall swiftly astern, its great, spinning drum dwindling against the stars. Then the mare of girders and pressure chambers that housed so many of my friends went by,

After a surprisingly short period, the motors cut out again. We had shed all the speed necessary, and gravity would do the rest. The ship was now pointing against the direction of its orbital motion and had to be swung round to enter the atmosphere nose first. The pilot did it with the low-powered steering jets at the wing tips. From where I sat I could see the short columns of mist stabbing from the nossles, and very slowly the stern swung around us.

We were still almost five hundred miles above the Equator, moving at nearly eighteen thousand miles an hour, but slowly dropping earthward. The coast of South America flashed by in seconds. Ahead lay the huge jungles of the Amazon, Now the great river was widening as we shot above its course. I saw that a big storm was raging below, all in silence as we raced overhead.

"A tropical storm," I said to John. "Do you ever have anything like that on Mara?"

"Not with rain, of course," he answered.
"But sometimes we get bad sandstorms.
And I've seen lightning twice."

"What, without rain clouds?"

"Oh, yes, the sand gets electrified."

The storm was now far behind us, and the Atlantic lay smooth in the evening sun. On the horizon I could see a band of shadow swiftly approaching as we hurtled into twilight. In mid-Atlantic we lost the sun, and at almost the same moment heard the first whisper of air along the hull.

It was an eerie sound that made the hair rise at the back of my neck. After the

silence of space any noise seemed wrong. But it grew steadily from a faint, distant wail to a high-pitched scream. More than that, it was tearing at the ship, slowing it down. There was a faint but steadily increasing tug from our straps. It was like sitting in a car when the brakes are being slowly applied.

We were no longer in a spaceship but an airplane. I was looking out into the darkness when I saw a faint red glow beneath me. At first, because there was no sense of perspective or distance, it seemed at an immense depth below the ship. I could not imagine what it might be. Then I realized, with a shock, that this ominous red glow came from our wing. The heat of our passage through the atmosphere was turning it cherry red.

I stared at that disturbing sight for several seconds before deciding that everything was quite in order. Nevertheless I was glad when we emerged into daylight once more. The glow was no longer visible. Besides, the sheer splendor of the sunrise, which we were approaching at ten thousand miles an hour, took away all other sensations.

A cluster of lights along the coast of East Africa told us that we were heading out over the Indian Ocean again. By now the pilot would be coming down the radio beam.

## NEXT MONTH . . .

POPULAR SCIENCE MONTHLY will tell you —not in fiction—how scientists are planning to send out artificial meteors as the first man-made things to scout planetary space.

I never knew the actual moment when we touched down. At one instant we were still airborne, at the next the lights of the runway were rolling past as the ship slowly came to rest, I was back on earth.

We moved slowly away from the ship toward the waiting transport vehicles. I looked up once more at the starlit sky. John Moore was waiting patiently behind me, clutching the door handle of the bus. He saw me looking up and followed my gaze.

But he was staring into the cast, where the first hint of dawn glowed. Among the stars was a brilliant ruby beacon—Mars.

I stared into that beckoning light and knew that I was going to disappoint Commander Doyle after all. The space stations were too near home. My imagination had been captured by that little red world glowing against the stars. When I went into space again, the Inner Station would be only a milestone on my outward road.



He was staring into the east, where a ruby beacon glowed. Then I knew the space stations were too near home, and only a milestone on the road to the stars.





Ever own—or this continue of the story probably are still amusing your friends with the story about some funny experience you had with it. Maybe your story would amuse other readers of POPULAR SCIENCE MONTHLY, too.





And to the person who sends in the best one by August 1, we will also give away the 1925 Model T we bought as practically junk, restored to perfect running order, and told about in a series of articles last February, March and April.

Your story of "My Funniest Experience With a stade! I" should be written—preferably typewritten—on one side of a single sheet of paper. We expect to get too many to acknowledge or return the ones we don't use. But if we print yours, you'll get a check for 10 bucks—and maybe our Model T.



Send it in-by August 1—to: Model T Ed for, POPULIT SCIENCE MONTHLY, 353 Fourth Avanue, New York 10, N. Y



## Home, James-in an MG

IF THAT looks like a limousine that shrank, you're close to right. Actually it is an MC customized into a landaulet. The rigid top

## All-in-One Window Washer



Fill, this plastic flask with a cleaning agent and the liquid seeps through a felt pad at one end to do a fast window-washing job. A squeegee at the other end strips the glass dry. There's no pail to lug, no cloth to wring out Hames, 301 S. 7th St., Minneapolis, sells it.

## Watch Keeps Tabs on Race Cars

A New Swiss watch for sports-car fans does a lot more than tell the time of day. It's a 1, 5-second stop watch; checks car

speed over a measured mile from 41 to 120 m.p.h.; records the clapsed time for a day's run up to 12 hours, and has a special unit counter to record the gallons of gas used on a trip. The Auto-Graph is sold in the U.S. by Abercrombie & Fitch, NYC.





whole works lifts off for sport driving. Fred

Strauss of Richmond Hill Auto Top, New

York City, built the unit for Bob Rischarde

## **Drill Powers Grain Elevator**

A FARMER can hang up the shovel and do a lot of scoop work with a new grain elevator run by a X-inch electric hand drill. The long conveyor tube has a worm at one end that digs in and moves 400 bushels of shelled corn or grain seed in an hour. Designed by the Tri-County Mfg. Co., Taylor-ville, Ill., it is now undergoing farm tests.

# River Speedometer A Aids Flood Control



WADERS AND "FISH ROD" are the equipment used for measuring the flow of a really small stream—such as the Kaskas River, near Rondville, III.



AERIAL CABLE-CAR RIG, set up for job, carries engineer measuring the speed of Sait River near Cheysottle, Ariz. Readings must be made every 50 ft.

If YOU come across a gent leaning over a bridge rail dropping what looks like a baby torpedo into the river below, don't bother to holler for the FBI. He's not a dangerous saboteur, but a government scientist trying to find out how much water is rushing to the sea.

Take a good look at his "torpedo" and you'll find it is solid lead, with instruments sprouting from its back. It reports depth and current speed. Since the river width is known, it's easy to figure how much

water is moving past every hour.

This is vital information, not just to trout fishermen but to a lot of other people. Engineers must know water flow to plan flood-control work and power dams. Farmers must know how much irrigation water to count on. River pilots must figure channel depths, mayors must plan for drinking water, utility men must reckon the head ready to turn generators. And industry gulps water for everything from steel to whiskey.

## Taking Water Inventory

To meet all these demands, the U.S Geological Survey is taking inventory on our water resources. Stream heights are gauged automatically at 6,500 points. Since the men with the lead torpedo make tables showing the current speed that goes with each water level, you can figure how much water is moving just from the level alone.

The heavy lead torpedo carries instruments to the right depth and holds them against the current. The gauge looks like a wind gauge, but its whirling cups measure moving water instead of air. Every fifth whirl they send a click over a telephone hie to the earphones of an operator above. He measures the water speed by counting the cheks in a given time interval.

As shown in the accompanying pictures, the survey men use all sorts of gear to get their torpedo to water. But they're proudest of their newest rig—the truck-mounted crane at top of facing page.



NEWEST RIO, used on Missessippi, is mounted on baby car that is small enough to go on sidewalk of many bridges. I rane can be rotated and adjusted to any angle by manually operated fluid jack. Rear take-off transputs engine power to reel through hydraulic drive. When engine idles, little torque de-

velops in drive and gauge can be dropped by releasing reel brake. Speeding engine develops enough torque to raise gauge. Thus operator can move from station to station along bridge without disengaging take-off. Built on a commercial vehicle by 1.5. Cenlogical Survey, rig costs about \$1,900.

ROWBOAT champed to line across eiver is used where there's no bridge and river's too wide

to be spanned by cable rig. Here Mississippi overflow channel is gauged during flood.





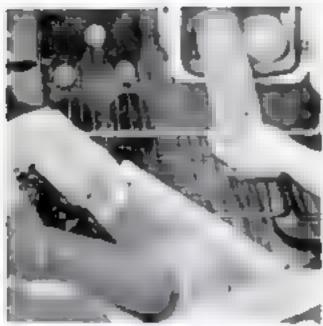
## Single Arch Supports Rainbow-Shaped Model Bridge

Like a man straddling a stream, the footbridge above spans the Rhine-Herne Canal in Germany. A single footing at each end supports the arch from which the walkway is suspended. Winner of a design contest, and claimed to be the first single-how bridge ever built, it is the model for a larger span to be erected in Sweden.



## The Germans Make Plastic Cars, Too

This de luxe racer steers just like a full-size car, each front wheel turning on its own pivot. The all-metal chassis has a transparent plastic hood and there's a bumper like a cowcatcher to take care of head-on collisions. The drive is pedomatic—the rear wheels chain-driven by a foot crank. Equipped with a hand brake and rolling on wire wheels like the hig foreign sport cars, the little runabout sells, in Germany, for about \$45.



164 POPULAR SCIENCE

## That's Not Salami

You can freeze this new chemical ice in refrigerator (left), then use it to keep picnic food cold. Called Sno-Gel, it thaws to a jelly.

## Two-Way Flash

A NEW flashlight bulb made by GE has two filaments that can be turned on independently to throw a spot or flood of light.





## New Magnesium Car Is Lighter Than Plastic

British sports-car body is rigid as steel, less than half the weight of plastic, and can be built on today's assembly lines.

## By William McGaffin

H CNIING for a sething lighter than steel A serican C ran sees are takeing a growing interest in pastic bidos fact they are even a k of a cover better bet " says R. J. Cross in a gaig di

Since last July, Cross has been driving a car with a signest boots

An old hand at disrepose and fabricating expess products. Cross made as those and other annual parts of the lightweight wonder metal for British



S-X MAGBODY, which weighs only 132 pounds, is mounted on Allard chassis powered by Mercury engine, holded magnesium, sheeting takes place of reinforcing pallars and the entire body is welded in one piece. Designer R. J. Cross towers over 56-inch experimental model.

JUNE 1953 |65



MAGBODY CAR in background could travel from Maine to California on 150 gallons of

gas which this featherweight magnesium tank will store for a British flying boat.

Spitfires during World War II. Now his plant at Gravesend is turning out products ranging from hush-hush defense items to hospital beds.

Cross believes his magnesium car body, which he calls the S-X Magbody, is the only one in existence. But he is sure that there will be a lot of them around in days to come.

## Uses Mercury Engine

The S-X Magbody is the result of 15 months of experimental study and design. Without doors it weighs a mere 132 pounds. A similar shell, made of steel, would tip the beam at 528 pounds. No exact figure can be given for a comparable plastic body, but Cross says reinforcing members would put the weight about halfway between steel and magnesium.

Cross mounted the S-X Magbody on a conventional Allard chassis powered by a Mercury engine. The car has a 112-inch wheelbase, a bumper-to-bumper length of 16 feet, and is 69 inches wide and 56 inches high. Its total weight, including

numerous accessories, is 2,683 pounds.

That makes a relatively small difference in over-all weight between the S-X Magbody car and one with a plastic or steel body. But Cross says this is only the beginning. He is certain that in time we will see an engine and chassis made of magnesium too. He points out that American manufacturers are already exploring the possibilities of making gearboxes, back axles and differential housings of magnesium, and that, section for section, it is cheaper than cast iron or cast steel. By substituting magnesium wherever possible, Cross figures, a car the size of a Cadıllac, weighing from 4,000 to 5.000 pounds, could be pared down to 2,500 pounds.

Cross feels that both in England and the United States there is too much optimism over plastic car bodies. He maintains that a magnesium body is not only practical, but lighter than an equally strong plastic body.

"True," he points out, "plastic would be approximately 15 percent lighter than magnesium on a section-for-section basis. But you can't produce the same sections in both. With plastic you don't go below one-tenth of an inch on large, unsupported panels without using heavy reinforcing material. On the other hand, magnesium lets you use .032-inch thickness."

In cost, he adds, the magnesium body can compete with plastic and might prove cheaper. Magnesium ingot sells at 25.4 cents a pound, and car-body gauges range from 50 cents to \$1.20 a pound in the United States. Reinforced plastic runs from 50 cents to as much as \$1.75 a pound.

There are other things to consider. The auto industry's craft practices could be switched over to produce magnesium bodies with only minor changes, Cross says. Plastic molding and thermosetting techniques, however, would call for radical changes in equipment and personnel.

Cross believes that, design for design, there would be little difference between the crash-resisting properties of a plastic and a magnesium body, but on a strength-weight basis the magnesium body should have an edge.

## Less Weight Means Quick Stops

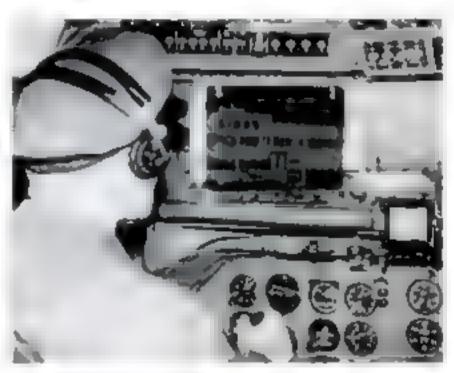
With the new alloys now available, he argues, a magnesium body should suffer less damage in a collision than a steel one. Not only would the lower weight of a magnesium body make it possible to stop a car more quickly; the metal itself would be more rigid than the light-gauge steel now used.

Cross isn't worned about magnesium supplies keeping up with mass-production demands. American car makers have pointed out that in 1951 magnesium production was only 40,000 tons, compared to 105 million tons of steel. He answers that magnesium is only one-fourth as heavy as steel. Car-body manufacturers can't take full advantage of that, but they can consider 40,000 tons of magnesium the equal of 120,000 tons of steel. What's more, given the incentive, primary producers of magnesium could expand production from five to 10 times.



## Plastic Straw Taps Vitamin C

THERE'S no dribble when you plunge the tip of this plastic Sip-Stik into the blossom end of an orange, lemon or grapefruit, and sip the juice through the straw. Unlimited Design, NYC, makes it.



## Sliding Sun Visor Aids Pilots

GLARE-REDUCING plastic visors, which can be moved quickly from one spot to another on a monorail track above the cockpit windshield, are being installed on United Air Lines' Mainliners and Cargoliners.



## The File Clerk Gets a Lift

This file clerk does all her work sitting down. A hydraulic lift raises desk, chair and clerk as high as five feet alongside the circular file. The unit also rolls forward or backward. The Wassel Organization, Inc., Westport, Conn., makes it.



## **Power Stick Fells Trees**

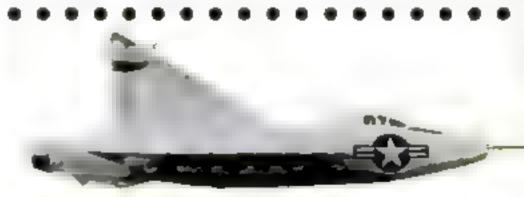
A ONE-CYLINDER engine drives a 12inch chain saw to cut down trees up to five inches in diameter. An interchangeable cutting head converts the tool to a power scythe for mowing weeds. Hoffco, Inc., Richmond, Ind., is the maker.

# How You'll Fly in 1975

WHEN you buy a flight ticket in 1975, you will step aboard a transport with a long, slim fuselage and wings so far back that they look almost like extra-large tail surfaces. And you will fly almost as fast as sound.

Military aircraft, too, will change drastically. Interceptors and bombers—those flows by human pilots—will streak to their targets at velocities much faster than sound. And even these swift jets will give way to rocketpowered missiles that can hit an enemy on the other side of the seas.

What you see on these pages are dramatizations of the shapes to come—dreamed up by Consolidated Vultee experts. But engineers generally wrap their dreams around a hard core of fact. Ten years ago, supersonic speed, now commonplace, was only a gleam in an optimistic engineer's eye.

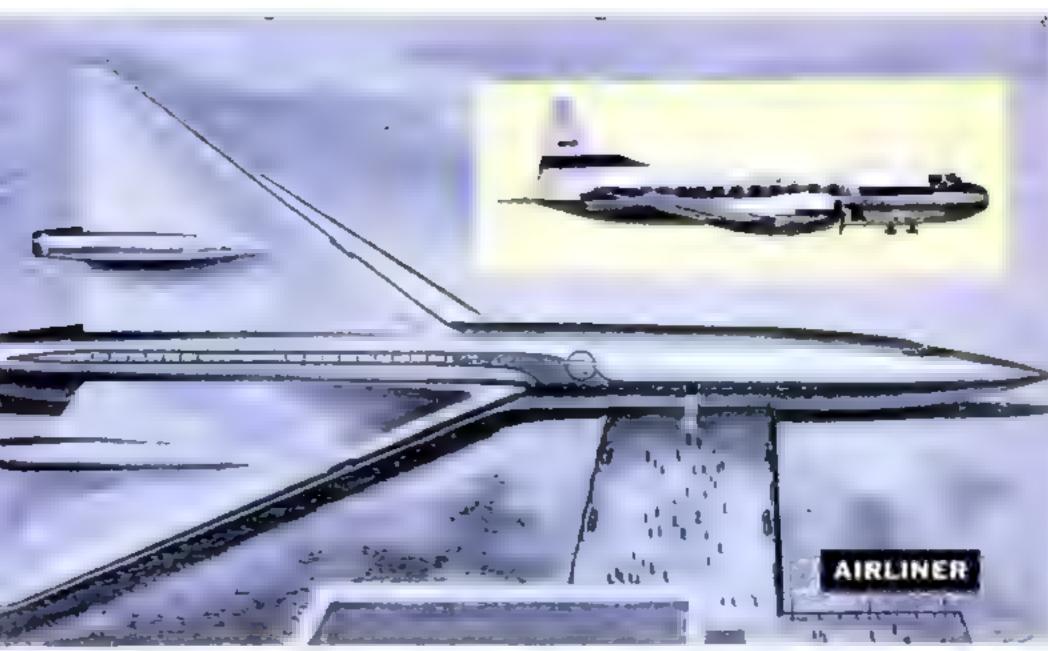


FIRST DEATA-WING PLANT ever flown, the XF-92A, above, was forerunner of the F-102 interreptor. It appears cumbersome compared with shapes to come.



today's intercontinental somes can fly halfway around the world. Power from jets helps puston engines for short bursts of speed. It will top 435 miles per hour.

68 POPULAR SCIENCE



GIANT DELTA-WING SEAPLANE, shaped like a toy dart, is the dream design that Consolidated Vultee engineers expect will supplant present Convair 340 for passenger service. The transport of the future would have a jet engine in vertical stabilizer as well as in each of the sharply swept wings, but is planned for near-sonic, not supersonic, speeds.



FUTURE INTERCEPTOR, flying from land or water, will reach very high speeds. Rake ahead splits air in supersonic flight. External gingerbread has disappeared.

FIGHTER



INTERCEPTOR MISSILE with large control fins would permit faster maneuvering to hit incoming bomber. Ground-fized, it could fly at speed of several thousand miles an hour.



ALL TOMORROW'S MANNED BOMBERS may be propelled by jets alone. Unlike the B-36 at left, some may be able to take off and sit down on land or water.



GUIDED MISSILE able to cross an ocean may replace bomber aircraft. Wings may disappear completely and fins operated by electronic brain guide missile to target.

BOMBE

## Show How to Show How to Champ Gas Savers

They've got a quick formula for matching a light car against a heavy one—and a bag of driving tricks for boosting mileage.

## By Andrew R. Boone

FELLOW from Detroit recently wheeled a new Ford six 1,206 miles from Los Angeles to Sun Valley, Idaho, on less than 45 gallons of gas-27 miles to the gallon.

How close can you come to getting

that from your bus?

Not very close, probably, for this fellow's light-footed performance won him first place in the carefully staged annual Mobilgas Economy Run. His car was tuned up like Fritz Kreisler's fiddle, and he had driven the exact route ahead of time-mapping every stop light, plotting the pitch of every slope, planning just how he'd drive every mile to squeeze the last ounce of push from every thimbleful of gas.

Without figuring things quite that fine, you can have a lot of fun-and maybe learn something that will save moneyby staging your own economy run.

## Gets 27 Miles to Gallon



SWEEPSTAKES WINNER Les Viland in Ford six saves gas coasting downhill in Idaho during drive to victory in Economy Run,

[] POPULAR SCIENCE

For tips on how to do it, I rode along on this year's Economy Run-a 27-hour grind, strictly refereed by the American Automobile Association, that carried 28 cars into four states and over five mountain crests in three days at an average speed of close to 45 miles an hour.

All cars in the run were stock '53 fourdoor metal-top sedans with front-wheel tread of at least 53 inches. Picked by the AAA without warning from salesroom floors, warehouses and assembly lines, they were entered in four classes, known in the industry as low price, low medium, upper medium and high, plus a special class for lightweights. There were also, for the first time, separate divisions for overdrive and automatic transmissions.

## Figure It on Weight

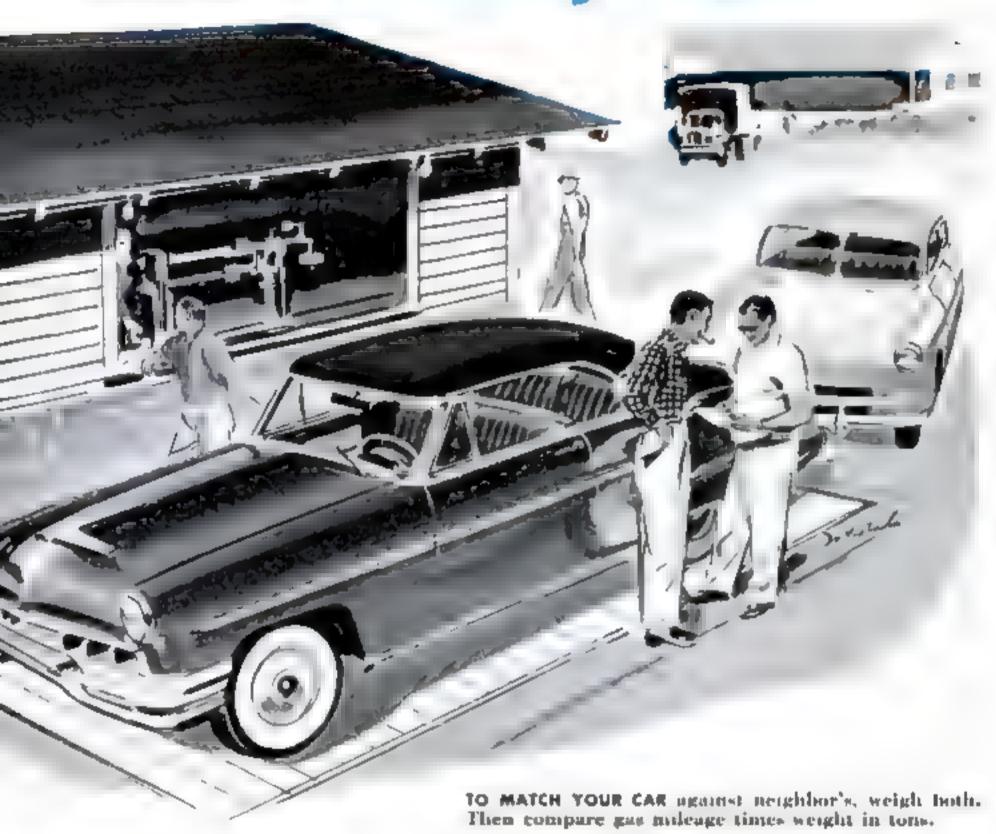
AAA experts know you can't match a heavy car against a lightweight on straight gas mileage. The light car would take the honors. So they match all on the basis of weight. Formula: gross vehicle weight in tons (including load allowed for gas and oil, driver and his relief, and two Caltech engineering students acting as AAA observers) times the official mileage divided by gallons of fuel consumed. The result is called "tonmiles per gallon."

In staging your own economy run, you'll want to find out two things: your own car's mileage and how it stacks up against neighbor Jun Jones's snappy

new Job.

Figuring car mileage is a cinch. Fill er up, clear to the top of the neck. Make a note of the speedometer reading. Keep tabs on gas purchased through a half-dozen refills. On the last filling,

# Own Economy Run



level off again at the top of the neck. Add up the gallons purchased (not counting the first complete fill). Subtract the starting from the finish mileage. Divide the miles by the gallons burned. You've got the average car miles per gallon.

But a run requires competition. Jun's new car may be larger or smaller, heavier or lighter. That's where ton-mileage comes in. Compute the results just the way the AAA calculates the figures. This procedure is simple, too. Both of you fill up at the same station. To make the competition as good a test as the pros', keep refilling until both of you

have covered about 1,200 miles, in town and on the road.

For accuracy, top off your tanks at the same station, alongside the same pump island, pointing in the same direction. At start and finish, jump up and down on the rear fenders. That will discharge air.

Say you're driving a Ford V-8 Crestline. It hits the scales at 3,400 pounds, full of gas and with you at the wheel. Jim's pushing a Chrysler New Yorker— 4,200 pounds, including Jim and fuel. At the end of the test, you each multiply actual gas mileage by car tonnage. Suppose Jim averages 15 miles to the gallon:



JOCKEYS WEIGH IN for Mobilgas' Economy Run. Each car carried driver, relief driver, two AAA observers—and enough lead weights in trunk to bring its total load to 750 lb.



PHYSICAL CHECKUP: Technical supervisors test wheel alignment of Nash Ambassador before start of run. Seventy seals on engine and mechanical parts barred tampering en route.

15 miles times 2.1 tons gives him a ton mileage of 31.5. To beat him, you've got to get 19 miles to the gallon: 19 times 1.7 tons equals 32.3 ton miles.

Whether you beat Jim depends partly on what shape your cars are in, but more on how you drive.

"Driving the road ahead may be an oldie," says Tom Frost, this year's referee, "but it's important."

"Where possible," Frost adds, "plan your approach to traffic signals to avoid shifting or stopping. Drivers on the Economy Run stop-watched traffic lights

## **How They Ran**

MARE &	mara Weste	MILES PER GAL.	
	PHITCH		der der

## 10W PRICE (Standard & Overdrive)

*Ford Molulino 6	Loc Vitored	27.0335 56,7022
Studebaker Champion	Vic Del Coma	26 8622 50 8770
Ford Moinline 8	Bill Hooks	22 5183 48 5494
Hudson Super Jet	Zolfe S. Lovdon	25 4279 47 9825
Plymouth Craebrook	Eddin Buhop	22.8301 46 9501
""Chevrolet Two Tee	Pete Novotny	Disquatified**

## LOW PRICE (Automotic Drive)

LINGSON NA	104 Elemin	44 03/ 3	41 4000
1.00344 14PM44444	Advandant 4 to		

## LOW MEDIUM (Standard & Overdrive)

Dedge V-6	Donny Eomes	23,4189	52 8565
Mercury Monterey	Bill Stroppe	23.1554	52 5629
Studebaker Commander	Dick Geiffith	24 5080	50 9767
Studebaker Land Cruiser	C. F. James	23,3962	49,7755

### LOW MEDIUM (Automotic Drive)

Studebaker Land Crusser	Clarke Sanders	22 8885	49 3476
Hudson Super Wesp	Lee Homer	19 0956	45,1229
Norh Stotesmen	Robert J. Steiner	19 4439	41.5321

## **UPPER MEDIUM (Standard & Overdrive)**

Nork Ambaseador	Andy Henderson	22 5457	51 3140
De Solo Firedome V-2	<b>Verne Helmquist</b>	20 9209	50,9843
Koiser Munkollan	Horry Greenwell	22 2707	49 0847
Pockord Clipper	Les Butts	18.4737	45.2838

### UPPER MEDIUM (Automatic Drive)

Nesh Ambassader Custom	Archie Bowen	21 1136	48.9037
Koiser Orogen	I, J. Highelson	21 4499	47 9835
Hudson Hornel	Hart Fullaries	18.9473	46.2409

### **MIGH PRICE (Automatic Drive)**

Lincoln Copri	Clay Smith	10-0414	32 3467
Chryster Importal	John Gerien	17.2909	48.1553
Chryster Mass Verber	Jim Jekan	17,7470	45,7000

### SPECIAL LIGHTWEIGHT CLASS

Henry J Corsoir 4	Woodward S. Sell	28 2567	DESTRUCTION
Nash Rombier Super	Pierce Venable	25.374B	45.2432
Averous-All Core		22 2869	48,6206

<sup>\*</sup> Sweepstakes Winner

in a score of towns and knew to the second their timing sequence. That saved better than a mile to the gallon in traffic."

"Shifting," says Art Pullsbury, chief steward for the AAA, "should be fairly precise. With manual gearshift, change from first to second as soon as you're rolling, into high by 10 miles an hour.

"You can't rush the shifting here. These transmissions shift naturally at certain speeds, say seven, 14 and 24 miles an hour. Just lift your foot slightly one mile

<sup>\*\*</sup> Got off course and for out of gos.

an hour above each speed. Kicking the throttle down may cause down-shifting, which you need only in passing or hill climbing."

How you go up and down a hill can make an enormous difference.

"The proper way," you learn from Earl Cooper, steward, "varies with the kind of transmission. Generally, go just fast enough to clear the crown at 20 miles an hour, make up the wastage by barely cracking the throttle downhill. That's the mileage that costs little. One car in the Economy Run got only seven miles a gallon up one grade, but 95 miles a gallon down the other slope."

## Drives Barefoot

"We hear funny things about drivers in the Run," Frank Verbeck, technical committeeman, told me. "Such as the man who sandpapered his foot and drove without shoes. You need no such stunt to keep the foot pedal steady. Just sit.

comfortably, with the seat adjusted for your length, and rest your foot easily on the throttle. Keep the linkage smooth and properly adjusted so you can make short throttle changes. Rest some weight on the heel to avoid pumping when you strike a bump."

"Sometimes it pays to pour on the coal," warns Frank Elliott, another technical expert. "If you have to drop down a gear on a mild hill, accelerate at full throttle in the lower gear, then shift up again. That uses less gas than climbing all the way at a slower speed. In cars with overdrive, some of the pros prefer second gear in overdrive instead of conventional third when things get a little too steep."

Those are tips from the experts. If your own results fall too far short of theirs, take the old bus in for a tune-up. It will save you money not only at the gas pump but in future repairs on a car that isn't running its best.



WHAT'LL SHE TAKE? Contest officials carefully measure gasoline capacity of Studebaker Land Crusser. For an informal economy run,

you can figure gas consumption by filling up at the start and keeping track of what you have to add to finish up with a full tank.





2 WIDE FLOOR for housetrader, with wheel wells attached, is shoved into position above utility deck. Seven feet wide and 12 feet long, it is made of exterior plywood.

1 TRAILER-DOCTOR MALONE starts face-lifting operations which will convert his flatbed into a land crusser. First the utility box sides are removed. The deck remains in place.



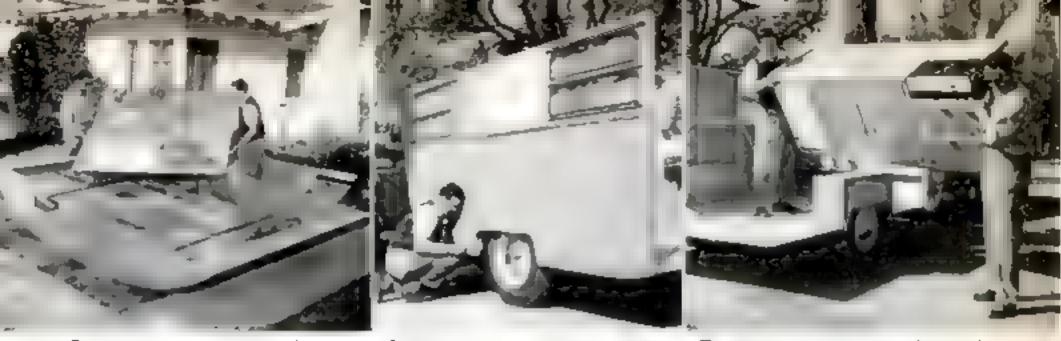
If YOU own a utility trailer, you've probable top that would turn it into a cabin on wheels for vacation trips. Al Malone, a Los Angeles trailer-designer, has carried that idea a notch farther. His between-wheels, flatbed trailer becomes a full-width land cruiser in half an hour.

To provide the broadened base for his knockdown house trailer, Malone removes the sides of the utility box and mounts a special floor above the regular deck. To this he attaches five plywood wall sections, anchoring them with a roof which doubles as a storage case for the other parts. Into this room—more than six feet high, seven feet wide and 12 feet long—go a kitchen unit and a double bed. The stove and cabinet section usually is mounted before the sides are

set up, but the bed can be eased into position just before the rear wall is attached. Complete, the outfit tips the beam at 1,300 pounds.

A convertible trailer model based on Malone's experimental design is now being sold by the J. H. Walker Co. Its several plywood sections are put together electronically, using high-powered dielectric heating to speed the curing of glued joints. The dual trailer combination, which costs \$990, f.o.b. Los Angeles, draws attention wherever it is shown. But Malone has a word of warning for prospective buyers.

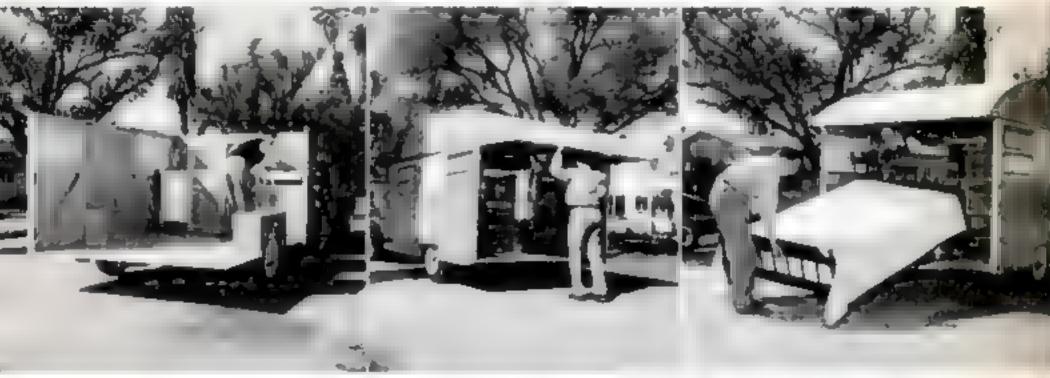
"Folks get curious," he says, "when a house disappears in its tracks or grows out of a flatbed in 30 minutes. Already I've had quite a lot of explaining to do to the hometown cops."



3 ARCHED ROOF does double duty as a storage box for walls, which weigh about 80 pounds apiece. Malone starts body assembly with any one of five panels.

4 SIDE WALL gets part of its support from holts along the base, the rest from connections with the wheel wells. A neoprene gasket along each edge insures watertight scals.

5 KITCHEN UNIT is horsted aboard ahead of wheel wells, then jockeyed into position and bolted down. It includes a sink, butane stove, icebox and cupboard.



6 front wall and right-hand side panel ahead of door. Remainder of side wall will follow. Only tools needed are a screwdriver and Allen wrench.

HEAVIEST SECTION is the 170pound roof, which is angled against rear corners of the side walls, and then slipped forward. Eccentric compression fixtures draw it down tight.

B course been been in through the rear, bor easy bonding, a special rack lifts it over the wheel wells. Now all that remains is to set up the rear wall with its built-in lights.

9 TIME'S UP, and so is the land cruiser. Most interested in Malone's trader are sports-

men who want one kind of rig to get to camp, another to do on-the-spot hauling,



# P.S.

## Last minute news & notes...

"PERHAPS THE MOST SENSATIONAL archaeological event of our time" is
what Jordan's Director of Antiquities, G. L. Harding, calls the
recent discovery of about seventy
2,000-year-old Biblical scrolls in
a cave near Jerusalem. They include
19 books of the Old Testament. Arab
shepherds unearthed them not far
from another cave where a Bedouin
found ancient scrolls in 1947
(PSM, Dec. '51, p. 98).

ARTIFICIAL LIGHTNING CRACKS WALNUTS for a growers' cooperative in Portland, Ore. A 65,000-volt, 5,000-ampere bolt shatters the shell but doesn't harm the meat.

ELECTRICITY STOPPED A RIVER from flooding excavations for a power plant at Essexville, Mich. Current was sent between 50 banks of positive and negative rods sunk into the ground. This stabilized the silty soil and prevented infiltration of river water. The system was invented by a German, Dr. Lee Casagrande, now at Harvard, and was first used during construction of U-boat pens in World War II.

IF YOU RAN OUT OF GAS last year, you had plenty of company. The AAA says 1,272,000 of its trouble calls last year were for that reason alone. But tires and batteries caused most breakdowns (see chart).

ROUTINE LIE-DETECTOR TESTS at the Oak Ridge atom plant have been stopped. The AEC says the cost in money and employee relations out-weighs any advantages, finds no proof that the instrument can catch spies. The lie detector will still be used in special cases, however.

SYMTHETIC OIL has made it possible to put jet engines of unprecedented power in our latest warplanes. Already in use, the Standard Oil development lubricates engine bearings and gears at temperatures above 450°, which would quickly boil away conventional oil under high altitudes' reduced atmospheric pressure . . . Tubeless tires. like those sold for cars, are now in use on jet planes and heavy trucks . . . RAF student pilots pay Start on lets right from the beginning. Reason: jet flying is so different that trainses waste much time unlearning piston-engine techniques.

SOAP BOX DERBY RACERS will compete Aug. 9 in Akron for the highest stakes in the 16 years the contest has been held. Top prizes include \$15,000 in college scholarships.

BRITISH ATOMIC ARSENAL includes four different weapons, according to a London newspaper. They are a rocket warhead, torpedo, artillery shell and guided bomb . . . High-school science Students may soon be using radioactive atomic materials in lab experiments—one supply firm plans to market special samples of limited, harmless radioactivity . . . Human cancers can now be kept alive in rats, an achievement expected to speed tests of new cancer treatments.

ENGINEERS NOW FIGHT CORROSION on ship bottoms the same way they do it in home hot-water tanks--with magnesium. Three tons of the light metal bolted to the bottom of a tanker are reported to have kept her 80 percent corrosion-free . . . Transistor car radios are foreseen by GE engineers, who point out that they would work directly off auto batteries, eliminating need for the vibrators now used.

The Editors

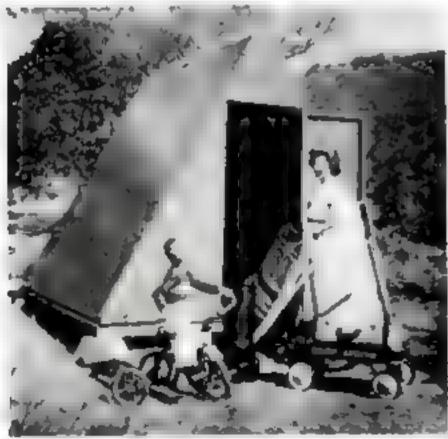
MECHANICS and HOMEBUILDING

You can put up this wood "pup tent" in a couple of days' easy work. It won't cost a fortune, either.

17'S A PLAYHOUSE. Small fry of the neighborhood will have a high old time playing their games with this handsome but as headquarters.



## You'll find dozens of uses for



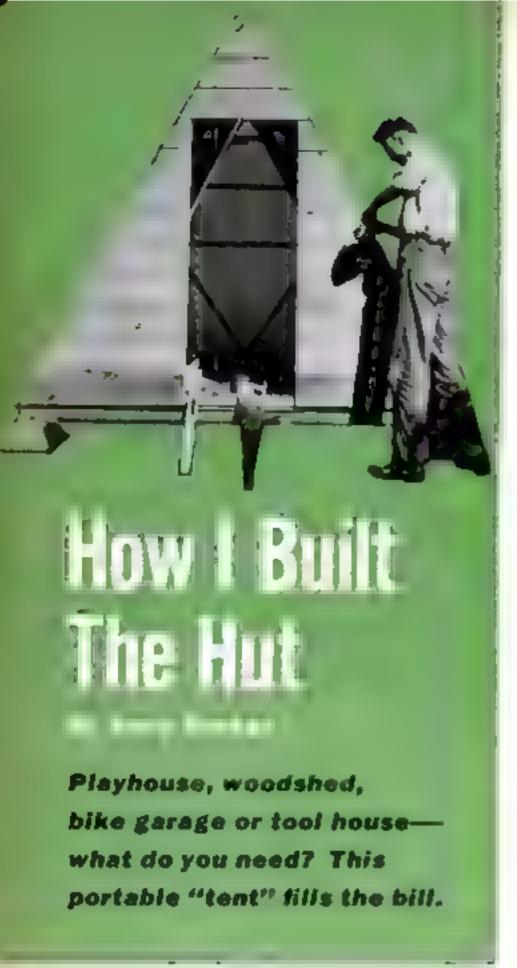
It's a STORAGE SHED. In most homes, there's never quite enough space for bicycles, coaster wagons, yard furniture and such things.

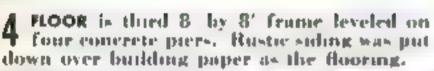
> IT'S A WOODSHED. After firewood is cut, don't leave it outdoors to soak up water. There'll be room in the hut for your garden tools, too.

Please turn page for how to build it.

The Hut
That
Jerry Built









1 THREE FRAMES were used, each one 8 by 8'.
These were made of two-by-threes placed on 21 centers with middle bracing.

WE WERE talking about building projects one evening and Philip said, "I want a playhouse. Philip is four

"And while you're at it " my wife clumed in "we need a place to store summer furinture and to put the children's bikes."

We also need a woodshed "I murmured My with thought a moment, "Well," she said, "you ought to design a little building to meet all those needs. Make it so it can be moved too—if we want to "

"Wow!" I replied. "Who do you think I am? Frank Lloyd Wright?"

My wife gave me a long glance. "No Not quite. But haven't you learned any thing from POPULAR SCIENCE?"

5 GLASS SUBSTITUTE, often used on farms, was stapled to frame of one-by-twos for one end. You might also use a vinyl sheeting.





2 two sides of the but were fastened together at the ridge with 6 strap bringes. The bringes go on inside of A-shaped frame.

3 covering consists of 'a' I' by 8' ashestoscement panels attached with 1," galvanized nails, talk joints where sheets butt.

So I started doodling nough sketches of outbuildings. They looked award

"Should be portable, eh? In times of stress I am apt to talk to myself. "Well, tents are the most portable shelters I know."

Something like a little electric-light bulb flashed in my brain

"Eureka" I shouted. "How about a hunding shaped like a tent, like a big pup tent maybe, that would be hinged at the top with big strap hinges and sit on a platform placed on concrete piers? Then if I wanted to I could just fold the whole thing up and take it away—like an Arab."

"Yeah," said a doubting little voice inside me. "You and three piano movers maybe! I used redwood two-by-threes for the trame and made the floor and one end from redwood rustic siding. The flooring is random width and random length, as well). I got it at a bargain price by shopping humberyards. I spent a little over \$10 for the complete job

My family liked the building and it was portable, just as I'd planned. We christened

it "The Hut"

"There's just one thing, dear," said my wife. She put a finger on one cheek and I knew what was coming. "It's much too nice a building to keep wood in

It is tem

So I'll have to build another.

END

6 orner end was made by nading rustic siding to one-hystwo frame. Then this end was serewed to the edges of sloping sides.

7 RIDGE CAP is two 5' lengths of aluminum overlapped and nailed in place. I painted the ashestos panels with red coamel.





### Record Caddy **Totes Phonograph**

The young music lover's mother will like this cart, too, for it makes cleanup easier.

THIS record caddy not only follows your A youngster wherever she goes, but it makes it a lot easier for mom to pick up after her, too. The wheeled cart rolls easily from room to room and holds a small phonograph and enough records to provide any young music lover with hours of happy listening. When cleanup time comes, it's an easy job to slip the records back on the shelves, coil up the cord on the cleat at the

> rear and wheel the cart back to the bedroom or out of the way in a

closet or alcove.

The 7h" shelves I made are just right for the 45-r p.m. and small 78-r.p.m. children's records For 10" records, make the shelves 11" high and deep.

Sides and shelves. These are made from either \$" plywood or pine. Cut out the sides first, sloping the fronts and rounding the tops as shown. Run a X" rabbet along the inside rear edge of each piece to take the back.

The shelves have a 45° bevel at the front and are fastened to the sidepieces with glue and countersunk wood screws. Rabbet the underade of the lower shelf to take the 25"-high base facing that runs across the front. The base, in turn, is beveled to fit the slope of the shelf. Use glue and finishing nails to get a tight joint between the shelf and the base.

Assembling the backs. Both the inner and outer backpieces are



RECORD CADDY keeps phonograph out from under little feet us well as big ones, stores records neatly where they won't get lost or broken.

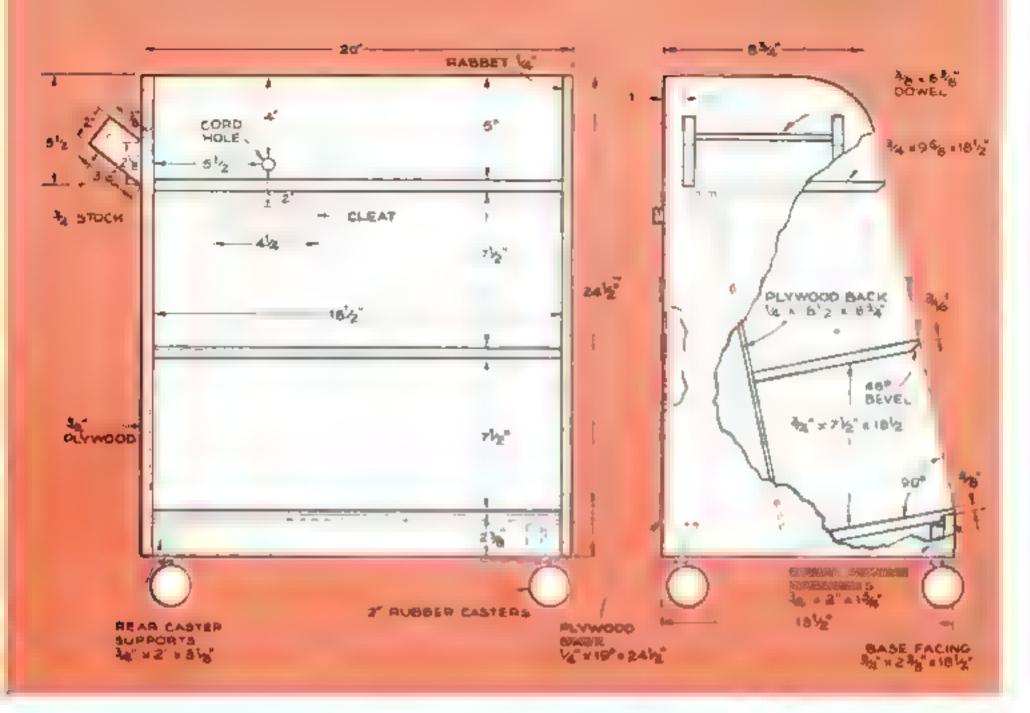


80 POPULAR SCIENCE

#### Cams Keep Glue Job Square

HERE is what I believe is just about the simplest way of gluing picture frames and small boxes and having them come out square. The two cams not only keep the frame square against the blocks but they exert pressure into the joint, thereby assuring a good glue job.

The wing nuts are turned down tight after the cams have been swung against the pieces of scrap wood that prevent marks on the frame.—Ican F. Vap, St. Paul, Minn.



" plywood. Put the inner one on first, fitting it snugly between the sides and nathing it to the rear edges of the shelves and to the cleat under the top shelf

Before putting on the outer back, bore a I" hole in it just above the top shelf for the player cord, and fasten on the wood cleat for winding up the cord when it's not in use. The back is their glued and nailed into the rabbeted edges of the sides.

Casters make scheels. Four 2" rubberwheel easters are supported by #" wood blocks fastened to the inside corners. The back two are 35" high and are serewed to the sidepieces, the front two are 14" bighand are screwed to the base facing

CASTERS ARE SUPPORTto by blacks screwed to inside corners of cart. Caster holes are drilled half into blocks, half into eart body.

The cart's handle is made from %" by 2" stock and a \$" dowel I finished the eart with enamel, after first sanding it down them on.—Sulvester I. Zuk. Chicago.



and applying scaler. You add decorations by putting on decals or cutting your own designs in cardboard steneils and painting

#### Springs Retain Shelf Divider

Unfilled bookshelves can be kept neater with this movable divider. It consists of two pieces of K" pine having a total height 2" less than the distance between the shelves. Coil springs are located in holes in one part and dowels glued in the other serve as guide rods. You put the divider between the shelves by compressing the springs. Strips of sponge rubber on the top and bottom edges keep the divider from slipping.—I. R. Sauvageau, Niagara Falls, N.Y.



Lots of duffers can bag a bear with a rifle, but it takes woodcraft to look one in the eye with a lens.

# How I Hunt with a Camera

By Shep Shepherd

WRITER SITS UP CAMERA in the reeds to shoot sitting ducks from the safety of a blind several feet away, after placing decays on the water in background. Note bar across top of tripod. This makes it possible for him to mount two cameras on the single tripod and operate both by remote-control cords.





A BLACK BEAR was shot from the safety of other rocks across the ravine. Regular lens in single-lens reflex made distant view at left, a telephoto lens gave the close-up below.



182 POPULAR SCIENCE

As hunters become more plentiful, game is becoming scarcer. So it is little wonder that more and more hunters are taking to the fields with cameras instead of guns. This way you can take game, yet leave it for the next fellow too.

In my book, there is no bigger thrill than capturing a good sharp picture of wild game in its natural habitat. Consider the case of Skip Reed, myself and the mountain lion.

We had tracked the lion several hours with Skip's dogs. Finally, we got into some high brush where the horses couldn't go. Our cat was in there somewhere. We knew it would be only a matter of minutes until the dogs brought him to bay. We tied the horses to saplings and waited for the signal from the dogs. When it came, we went in:



Skip with his .30-08, me with my twin-lens reflex.

The cat came to bay on the ground (unusual for a cougar). Skip kept the brute in his sights while I worked up to within 20 feet and got my first picture. The sound of my shutter alarmed the cat and caused him to take off for a half-dead tree. He made it—with the dogs snapping at his heels. There he sat, snarling his hatred. Again Skip lined him up in the sights while I came up underneath for two more shots.

That was two years ago. Today the lion's skin hangs on Skip's wall. Three wonderful pictures of the lion, full of ferocious

life, hang on mine.

#### Picture Hunter Must Be Patient

Some wildlife pictures are the result of luck. But the best ones are a reward for patience and woodcraft. It requires a far greater amount of these attributes to bring back good pictures of the game than to bring back the game itself.

There are several ways to go about photographing wild game. The easiest and surest is to carry a camera equipped with a good telephoto lens. The most thrilling and most deeply satisfying way, however, is to

stalk the game and photograph it with an ordinary lens. This not only adds to the thrill. It does away with the necessity for expensive telephoto lenses.

Of course there are times when it is best to use a telephoto lens; when you don't dare go nearer the subject. I had that happen once in Siskiyou County, Cahfornia, I caught sight of a big black bear as I climbed a rise on the way back to where I'd left my car. The bear was nosing around some large boulders looking for food. I worked my way up to within 40 yards, coming upwind. There was enough cover to bring me closer—much closer—without attracting



the bear's attention-maybe. It was the "maybe" that stopped me. I was not armed. I knew that bears never attack without provocation. But I had no idea what a bear

Writer photographed mountain hon up a tree while companion kept a gun on animal.





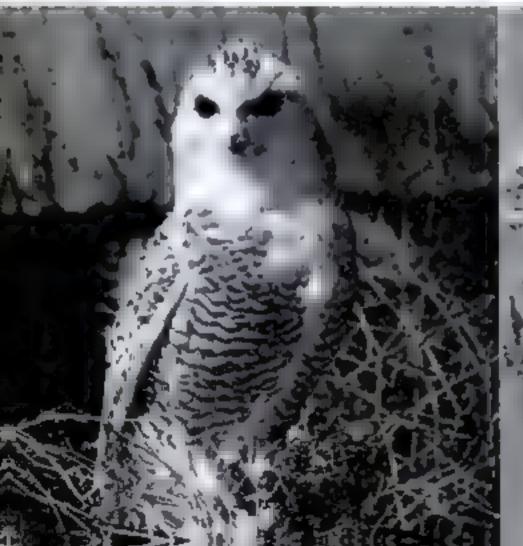
A PACK TRIP through mountain scenery as beautiful as this will give your camera a good

workout. A light-vellow filter slipped over the lens will bring out any clouds in the sky.

a few pictures with the normal lens. Then I inserted a telephoto and made close-ups in this case I was using a single-lens reflex which would quickly accept lenses of different focal lengths

snow owt. If you can spot this fellow while he is husy feeding, he is rather easy to stalk for close-up shots. A senu-telephoto lens got this picture from about 25 feet away. The camera you hunt with should have a top shutter speed of at least 1/200 second, preferably 1/400 or 1/500, and a lens opening of no less than f 4.5. Compactness is a major factor, too. The smaller cameras have these advantages but have the draw

YOU CAN HUNT AT SEA, TOO. This picture of a leaping albacore was made with a 35-mm camera at 1 1,000 second. Fishing with a camera can be as much fun as using a hook.







LITTLE TOUGHIEL This angry-looking burrowing owl seems willing to spot you a couple of

hundred pounds and still take you on. The writer found the bird in an old barn.

back of small negative size. The big presstype cameras are too bulky and cumbersome for most hunting-and-fishing territories. Roll-film cameras giving a negative size of 24" by 24" or 24" by 34" are a good compromise.

Not too many cameras of this size can be fitted with a telephoto lens. However there

are supplementary shpon lenses that will increase the power of the
normal lens as much as
four times. Also equip
the camera with a good
shp-on sunshade. This
is important. Without it
you must always shoot
with the sun somewhere
behind you and the game

may not always be obliging enough to get in the proper position. With an efficient sunshade you can shoot almost directly into the sun without ruining the negative with lens flare

I once had an experience with another bear that taught me one paramount rule of game hunting with a camera: always be ready to shoot quickly.

Two of us had gone up to the high Sierras

for opening of the California trout season in early May. At that altitude, 7,500 feet, snow still covered the ground, Early one morning we heard a noise outside. Eddie pushed open the flaps of the tent and unmediately yelled "bear!" I threw the blankets aside and grabbed for my camera at the foot of my bed. On top of my camera

case I had piled clothes, plus tackle box and gear. Hurriedly I tossed the stuff aside, got the camera out of its case, removed a used holder and slammed in a fresh one. In the meantime Eddie had gotten his camera out of a coat pocket and was standing by the

open flap, anxiously peering at the little red window in the camera back and hastily turning the knob to advance the film to the next number.

By the time we were ready to shoot, the bear was disappearing into the timber at a fast lope. All we had left were his tracks in the snow. By those we could see where he had stopped and stood upright, apparently when Eddie yelled. What a picture





NEVER GET THIS CLOSE to a loose mountain from unless you are backed up by a good man with a hunting rifle. These cats are big and rough. Telephoto lens was used here.

that would have been—the bear standing there upright as if posing!

Your camera should have synchronized flush attached. Most game is nocturnal, moving freely at night. That's the time to do some thrilling camera bunting and that's when flash is indispensable. You will have to locate a game trail, a den or a watering place, then take a position downwind and wait. This gets tiresome but it pays off in excellent pictures. Pre-focus the camera at one spot and wait for the subject to get in place. Don't worry about the night being dark. You'll be surprised how well you can see after your eyes become accustomed to the darkness.

I like the thrill of stalking game and I think you will too. But you also can get pictures while you are asleep in bed if you prefer it that way. In one way it's even



more thrilling because you never know what you've photographed until the film is processed. You do it by setting a camera trap for game that happens along

First locate the best spot, most likely a game trail. Lash the camera securely to a tree, aim it at a given spot and cock the shutter. Run a stout string from the camera shutter release down to 2" or 3" above the ground and across the trail where the camera is focused. Pass the string around

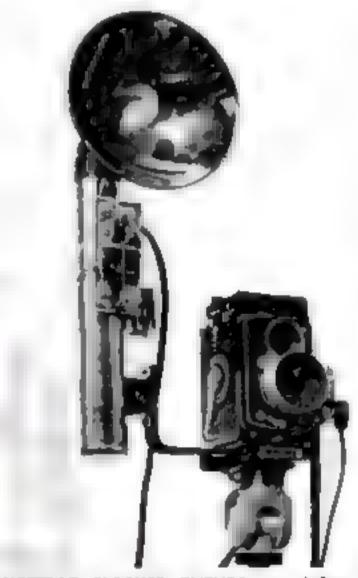
saplings or drive small stakes if necessary to lead the string where you want it. Put a flash bulb in the gun and everything is ready. When an animal hits the string be takes his own picture.

#### Hose to Bait a Camera Trap

You can use bait with camera traps too. Attach the string to the bait so the shutter will be tripped no matter how the game approaches the bait. Protect the camera as well as possible against weather. Usually a piece of cardboard or heavy paper tied to the tree just above the camera and projecting over it is all that is needed. Next morning you find the flash bulb fired and the shutter snapped. Imagine the excitement and anticipation until you see the finished negative!

You'll get to know your game animals better through camera hunting. You'll learn woodcraft too and increase your enjoyment of the outdoors a hundredfold.

So get a camera and go hunting. You will be amazed at how much downright pleasure you've been missing.



MOUSETRAP FLASHES PICTURE at night when this setup is used to operate solenoid-actuated shutter. When animal stumbles into dark cord stretched across game trail, the cord yanks the trigger of the trap, tripping the camera shutter. Sharp impact of spring depresses release button (behind top of trap), taking picture. Rubber bands hold trap on.



1. Trimming the Easy Way. You don't have to get down on your hands and knees to trim around lawns and gardens with this electric edger. Powered by a 115-volt motor, the rotary cutter is shock-mounted to prevent damage from obstructions. A guard shields the operator from flying dirt.



2. Planted Hose Sprouts Water. Dig a narrow slit in your lawn, press in this plastic sprinkler hose and you have a permanent underground watering system without harming your grass. The 100' hose has eight spray nozzles 10' apart, covers 800 square feet and will not corrode.

### New Gard



Sprinkler. The arm on this new lawn sprinkler revolves for a swirling spray or can be locked to provide a fixed stream in any direction. Two

tiny spigots on the ends permit individual adjustment of each jet up and down and sideways. The spray also can be varied from a fine mist to a heavy downpour.



S. Four-Tool Kit. Four stub-handled tools for working at close quarters are packed in this gardening kit. The kit contains trowel, hoe, sharp-pointed cultivator and pruning shears. The matching handles

are made of molded plastic, shaped to fit the hand for a good grip.

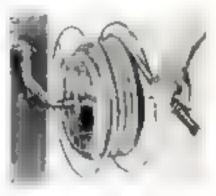
### dgets

4. Prefab Fence. You can add a small fence to your lawn, garden or path by simply pushing these pointed plastic sections into the ground. Each section is 16%"



high and 14" wide and meets other sections to form a continuous line. The white plastic is strong, won't rot or rust and does not need to be painted.

6. Real Fits Faucet. This 100' hose reel attaches directly to a faucet, eliminating permanent mounts and permitting it to be moved quickly from one faucet to an-



other. Water flows into the hose through a swivel joint in the reel hub. A second swivel joint at the faucet permits the reel to be turned at any angle.

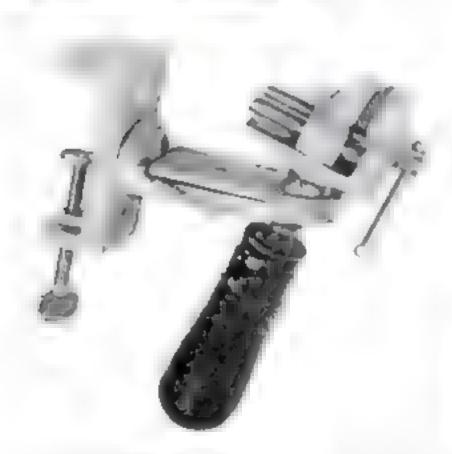
Further information on these products can be obtained from: I Stanter Electric Tools, New Britain, Conn.; 2 Baro Plante Co., 201 V Svenmore St., Santa Ann. Calif.; 3. Ethan Mig. Co., 1401 W. 51 Lin. Ingeles 17., 4. Hauser Products, Inc., 4034 N. Animar Ave., Chicago St., 1. J. T. Henry Mig. Co., Hamden, Cann., 6. Craca Corp. 933 Air K.n., Glendate 1, Calif.



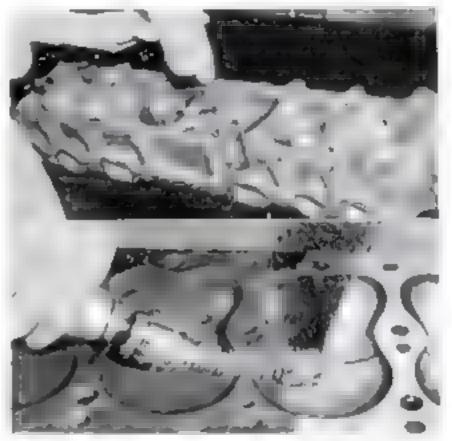
Quickly. Fill this tray with mortar, run it along the top of a masonry wall, and it spreads a smooth, even bead of mortar right at the edge. Run another bead along the opposite edge and voule ready to lay the next course of blocks. The tray can be used on all types of bricks and blocks and has adjustable end gates that are raised or lowered to control the amount of mortar as it is dispensed.



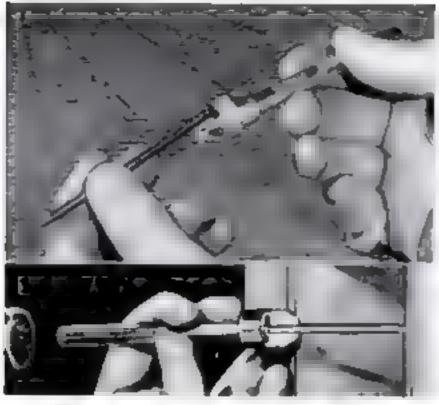
2 Rubber Pad Sands Curves. The thick, flexible foam-rubber pad on this sanding which lets it follow curved and other irregular surfaces where stiff-backed disks wouldn't reach. A special adhesive on the face permits quick changing of sandpaper disks—you simply peel off the old one and press on the new one. The wheels fit he chucks, or he chucks with an adapter, and come in 44", 54" and 8" diameters.



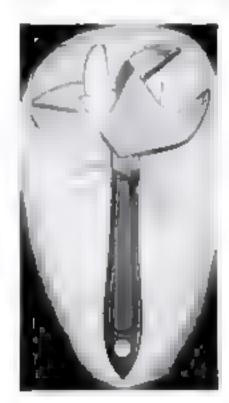
Wise Tilts to Any Angle. Tiny, hard-to-hold parts can be grapped in any position in this small movable vise. It pivots in a ball-and-socket mount, can be moved by the wood handle below it and locked rigidly at any angle. Its 2" jaws have a 2" opening and can be replaced with interchangeable curved jaws for holding round stock. A model with 3" jaws is also available.



4 Drill Removes Carbon. Caked-on carbon, weld slag, rust and other stubborn deposits can be quickly removed from metal with these rotary scrapers. They fit %" electric drills and have flexible shafts for following curves and getting in recesses (bottom photo). A long, pointed scraper is used for cleaning out small openings like valve ports (top photo).



5 Holder Starts Nails. This holder gnps a nail for you as you start it in grooves, corners or other hard-to-get-at spots, saving both your fingers and the finish from stray hammer blows. The slotted head holds all types of nails, including roofing and finishing, and the pointed tip can be used as a nail set for countersinking.



Wrench Adjusts to Nut. This openend wrench will fit any nut from X" to 1X". The jaws close as the head is pivoted around the handle, gripping the nut tighter the harder you push. In tight spots, the ratchet-like action lets you sho the wrench and retighten it without removing it from the nut.

9 Plaster Smoother Gives Any Finish.
You can get any type of plaster finish from coarse to smooth just by varying the angle at which you hold this aluminum darby. Longer and

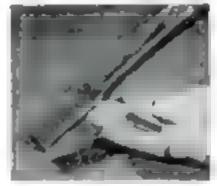
darby. Longer and lighter than conventional wood darbies, it's said to cover more area faster and reduce arm fatigue. It comes in four lengths from 36" to 58".





Bandsaw Attachment Cuts Metal. You can quickly convert an ordinary bandsaw to cut metal with this gear-reducer attachment. The special gear mounts between the bandsaw shaft and the original drive pulley, reducing blade speed to 200' per minute for cutting metal. The saw can be switched back to wood cutting by shifting the position of the drive pulley and changing blades. The attachments will fit two-wheel bandsaws with up to 16" wheels.

6 Kit Rehandles
6 Hammers. New
handles for hammers
and hatchets can be
had in kit form to fit
all types and sizes of
heads. Each handle
comes with a hard-



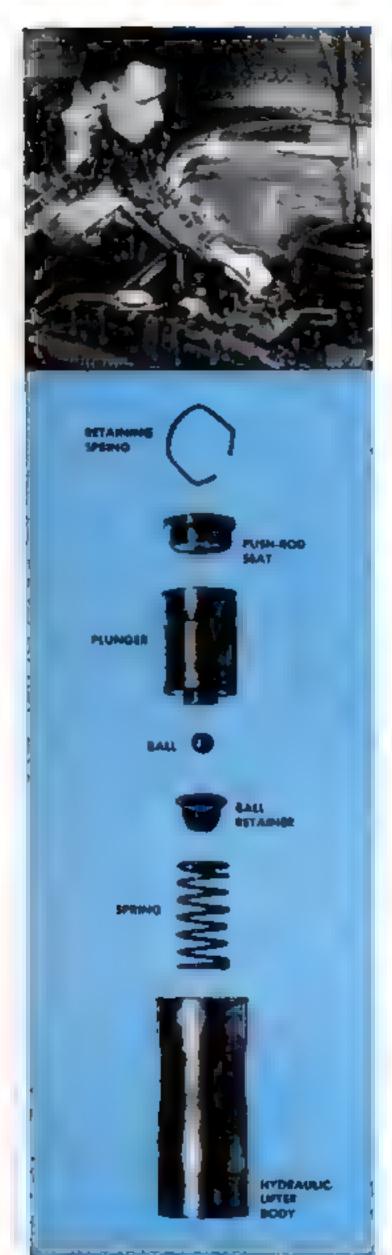
wood wedge and a metal cross wedge and instructions for installing it in five minutes.



10 Extension Rod Holds Drills. This drill extension rod lets you reach deep drilling locations without buying special long-shank drills or having to braze your own extensions. The rod is 8%" long and fits %" chucks. Individual chucks, fitting the end of the rod, are available for drill sizes from No. 52 to No. 10 and 1/16" to 3/16" by 64ths.

Further information on these tools can be obtained from: 1. Kekest Co., Curvensville, Pa.; 2. Carborandum Co., Niagara Falts, NY; 3. Bellows Mfg. Co., 1017 N. Central Expressiony, Dallan, Icz.; 6. Thorsen Tool Co., Oakland, Calif; 5. Pollock Engineering Co., 10342 So. Charch St., Chicago 43; 6. Raylen Products. 198 River Meadow Drive, Rochester 18, NY; 7. Fuller & Helimann, Inc., Moro, Ore; 8. Favette R. Plumb, Inc., Philadelphia, Po.; 9. C. D. Contracting Co., 2051 McKoo Ace., S.W., Grand Rapids Mich.; 10. Beaver Tool Co., Box 298, Hantington, L. I., N. Y.

# How to Cure Noisy Valves



Hydraulic lifters in some of the new cars may set up a clatter unless kept oiled. Here's what to do to shush them.

#### By Basil Hoover

"HYDRAULIC valve lifters are fine as long as they work the way they're supposed to," said a friend of mine the other day. He had just taken his car to a repair shop to have a clicking valve fixed, and was complaining because he thought the labor charge was too high. "Valves used to get noisy on my old Chevvy," he grumbled, "but it took only about 30 minutes to adjust them."

I felt like telling him that he should have changed the oil before it got dirty enough to cause trouble; but I'd often told him that. So I merely made some vague remark about everything having disadvantages.

The hydraulic valve lifter has become widely used during the past few years. Buick, Olds, Lincoln and Cadillac use it, for example; and when Chevrolet offered the Power-Glide model in 1950 the engine was equipped with hydraulic valve lifters. Perhaps the lifter is most appreciated by Power-Glide owners because it has hushed Chevvy's notoriously noisy valves.

A properly functioning hydraulic valve system is practically noiseless. Noise is a sign of trouble. Fortunately the trouble can be corrected by anyone who is moderately skillful at working on an engine.

Cleaning may stop noise. A noisy hydraulic valve lifter is usually dirty. The regular motor oil circulates through the lifter and dirt and gum from the oil tend to collect in it. While the cleaning process is not difficult it is time-consuming. If you are a car owner who keeps an eye on the pocketbook you may prefer to consume your own time instead of your money.

With the exception of one adjustment, the same procedure can be used in servicing hydraulic lifters on both the Power-Glide Chevrolet and the Dyna-flow Buick.

The valve-in-head V-8 engine used by Olds and Caddlae has a hydraulic valve lifter that is fundamentally the same as that used by Chevrolet and Buick. The method of removing valve lifters from the V-8 motor is different, but not difficult.

THESE ARE THE PARTS of a typical hydraulic valve lifter. Used like a stethoscope as in the photo above, a rubber hose will help you locate a noisy lifter.

If you want to work on Chevrolet valve lifters simply follow the method described and illustrated here. If you have a Buick, Olds, or Cadillac, note the variations that apply to your particular car.

Locating a noisy lifter. One quick and easy way to locate a troublesome valve lifter is with a piece of rubber hose, used stethoscope fashion. With the motor idling hold one end of the hose to the ear and place the other end against the rocker arm. If the lifter is functioning properly a dull, scarcely audible click will be heard, combined with the cushioning sound caused by the oil in the lifter. If the lifter is faulty a hard, sharp click will be heard through the hose. Some experienced mechanics can locate bad lifters by putting their fingers on the rocker arms while the motor is running. The amateur mechanic, however, can do better with the make-shift stethoscope.

The hydraulic valve lifters are located at the lower end of the push rods and operate directly off the camshaft. They can be reached by removing the push-rod cover plate from the side of the motor.

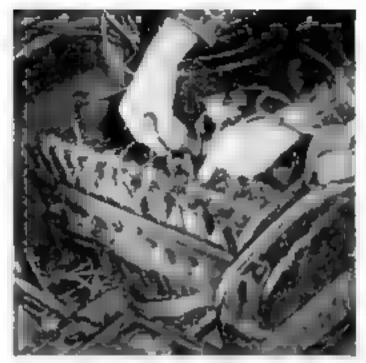
Removing the lifter. After the noisy lifter has been located and the push-rod cover removed, the next step is to take out the push rod. The easiest and quickest way is to slide the rocker arm to one side and lift the push rod out beside it. In doing this, first make sure that the rocker arm is not holding the valve open. Then loosen the adjusting screw all the way. The arm can then be moved sideways and the rod lifted out. Another method is to unbolt and remove the entire rocker-arm assembly.

When the push rod has been taken out insert a hooked wire in the top of the lifter unit and lift it out of the engine block.

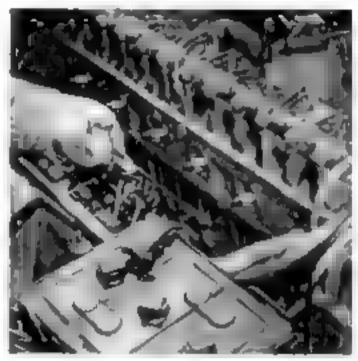
The lifter is made up of seven parts. Disassemble the unit by removing the small spring at the top—but before this can be removed the plunger must be depressed slightly. If you try to push the plunger down with a small screwdriver handle or any other blunt object you will find it practically impossible because of the oil pressure within the lifter.

The secret is to insert a small object about two inches long through the hole in the top of the plunger. A pin punch, small Allen wrench, or even a piece of stiff wire may be used. Pushing down on the small tool releases the oil pressure by holding open the ball-check valve at the bottom of the plunger.

Checking a lifter. After taking the unit apart clean it thoroughly. Then uspect the various parts for defects. The plunger should move freely in the body but should not be so loose that it wobbles. The most important thing is the ball-check valve. Make sure the ball doesn't have a flat side and that it is seating properly. If any of the parts are defective you will save time and trouble by buying a new lifter unit. When reassembling the lifter, line up the



FIRST STEP in having a look at a Chevry lifter is to slide rocker arm to one side and lift the push rod out beside it, as is being done above.



TO UFT THE UFTER from the engine block so you can work on it, bend a hook in a piece of wire and insert the book in the top of the lifter.



TAKE LIFTER APART by inserting a small Allen wrearh through hole in top as at left to depress plunger and free the retaining spring. After cleaning, reassemble the lifter by inserting the wreach through aligned holes to hold down the plunger while the spring is being replaced.

hole in the side of the plunger with that in the body. Push the plunger down until the two holes are aligned and put a small Allen wrench through the holes to keep the plunger down while the retaining spring is being replaced. After the lifter is reassembled fill it with the same oil that you are using in the motor.

Lifter parts are not interchangeable, and to avoid the danger of getting parts of different lifters mixed it is best to disassemble only one unit at a time.

Making final adjustments. In finishing up the job the rocker-arm screws must

be readjusted. This adjustment is extremely simple – much simpler than with nonhydraulic valves

First make sure the camshaft is in the closed-valve position. If a lifter on cylinder number three, for example, is being adjusted remove the distributor cap and crank the motor until the rotor points to the number three high-voltage contact and the breaker points are open. The piston is then at the top of the cylinder and both valves are closed.

Next, take hold of the push rod with one hand and gently jiggle it back and forth sideways as you screw down the rocker-arm adjustment. By jiggling the rod slightly you will be able to tell when the adjusting screw

makes firm contact with it. As soon as this occurs—when you can't jiggle the rod any more—stop. Then carefully screw the adjustment down exactly one and one-half turns more. That's all

The valve-lifter plunger can travel a distance in the body cylinder equivalent to three turns of the adjusting screw. One and one-half turns places the plunger in the midpoint of its travel.

The Chevrolet adjustment is one and onehalf turns; but on the Buick the correct adjustment is two turns of the screw after it makes contact with the push rod. Otherwise Buick valve lifters can be removed and serviced according to the procedure described for Chevrolet.

Working on other cars. On the new valve-in-head V-8 engine used by Olds and Cadillac the lifters are located in the V between the two cylinder banks. Before the lifters can be reached the intake manifold must be removed. Under the manifold is a valve-compartment cover plate. The disassembly job sounds more difficult than it actually is because the manifold can be taken off rather quickly and the compartment cover presents no problem.

The rocker arms on the V-8 engine have

no adjusting screws. All parts of the assembly are fitted to close tolerances and it is extremely important not to interchange any parts of the valve system whatsoever.

Push rods on the V-8 engine can be removed singly without unbolting the entire rocker-arm assembly. Since there is no adjusting screw the valve spring must be depressed before the rocker can be slid to one side.

Hydraulie lifter units on Olds and Cadillae are smaller than those on Buick and Chevrolet, but the basic design is the same.

Are lifters getting oil? When servicing the V-8 engine be sure to inspect the passages that feed oil to the lifters, for oil starvation will cause noisy operation. If you

remove a lifter and find no oil in it, the short passage leading from the longitudinal oil header to the lifter bore is clogged. This passage is a visible opening in the side of the lifter bore. A clogged oil passage is a common trouble on the V-8 engine.

When you've finished servicing the lifters on an Olds or Cadillac, merely put the motor back together. There is no valve adjustment to make.

Where hydraulic valve lifters are concerned, an ounce of prevention is worth a pound of cure. The prevention is simply clean oil. But once the lifters start clicking it is too late for prevention.



FINAL ADJUSTMENT on a Chervy rocker arm is a one and one-half turn of the screw. For a Buick adjustment allow two full turns.

### Cut-Down Steering Wheel Gives Wide-Open View Ahead

My cur-pown steering wheel gives me a better view of the road ahead, and I don't have to crane to check the instruments. By giving the crescent half a turn, I can slide in or out of either side of the car with ease, or swing completely around to get at anything stowed in back.

As a veteran steering-wheel doctor—I've operated on 10 cars during the past 14 years—I've found that for easy turning the remaining crescent should encompass a bit more than 180°, and that a wheel spinner

is a real help.

To cut down a wheel I simply remove it, clamp the unwanted section in a vise, and hacksaw it off, leaving some material for firushing with a file. Emery cloth, followed by buffing or a coat of clear lacquer, restores the gloss of the plastic or rubber. The horn ring gets the same cut-down treatment.

Some modern wheels have two spokes, arranged in the form of an inverted "V." Such a wheel must be remounted upside

#### Mail Delivery Window-Door



A WINDOW-DOOR, made of %" clear plastic, saves time on my Rural Free Delivery route. It is the same size as the regular window, but has a large hole cut in the center, framed by strips of clear plastic cemented in place and set off by decorative brass bolts. The door, also of plastic, is attached with two butt hinges, and has an inside locking handle.

To install the window-door I crank down the regular window, remove the molding, and slip the plastic member in the casement. Because the hinges are at the front, air pressure automatically closes the door.

—Wilmer S. Geissinger, Quakertown, Pa.



down to give a large enough surface for steering. That means that a new keyway must be cut in the hub or, if the hole is serrated, a notch must be cut in the ungrooved surface, before the wheel can be inverted.

Whenever a wheel has to be turned upside down, make sure to index the directional light cam.—John Kany, Dearborn, Mich.

#### Clamp Makes Ring Compressor

A strain of sheet metal and a hose clamp of the type which uses a worm screw for tightening make a handy and inexpensive compressor for occasional ring jobs. The sheet metal should be several inches longer than the ring circumfer-



ence, and the clamp which compacts it has to be lengthened by cutting it opposite the screw and riveting ends to box strapping.

-K. Heryford, Cedarville, Calif.





## GUS PUTS THE HEAT

Barnes was a big wheel at the local bank, but he was banking on Gus to cure his MG in time for the road races.

GUS WILSON was just finishing up a brake adjustment when Stan Hicks, his young helper, came back into the repair shop.

"The foreigners sure are taking over,"

Stan said.

"Foreigners?"

"Yeah, those snazzy foreign cars. Bet I've gassed up half a dozen

this morning."

"Oh, sure. Didn't you know about the road race the sports-car boys are holding out on the Mill Road Saturday? They'll probably be coming to town from all over."

During the next few

days, the Model Garage looked almost like a petrol station on the Continent. By the tune Friday afternoon came around, Gus had poked his head under the hoods of more Healeys, Allards, Romeos, MGs, Jaguars and Ferraris than he had ever seen before.

It wasn't until late Friday that Gus was able to take a breather. "Well, Stan," he said, "looks like the rush is over. I'm going to call it a day."

But Gus had no sooner got the words out

of his mouth than he heard a car pull up.

"Sounds like another foreigner," said Stan.

It was a trim little black MC with the top down, The big man driving it made it look even smaller.

"Something we can do for you?" Then Gus did a double-take.

The man at the wheel bore a remarkable resemblance to J.B. Barnes,

president of the local bank. Of course it couldn't be Barnes. Gus looked closer and his jaw dropped. Maybe it couldn't be. but it was.

Gus had banked at Barnes's institution for several years and he serviced the financier's



Gus did a double-take when he saw who was driving the little sports car.



## ON AN MG

#### BY MARTIN BUNN

imposing limousine regularly, but he never expected him to turn up in a leather wind-breaker and old cap, driving a midget car.

Grinning, J.B. was extricating himself from the driver's seat. "No, you're not seeing things, Gus," he announced jovially. "And it's not as funny as you might think. Used to be a scorcher in my younger days. Drove a Stutz Bearcat—there was a car for you! Even did a bit of dirt-track racing."

"No kidding," Gus said admiringly. Things began to add up. "Say, I'll bet you're going

in that road race tomorrow."

"You guessed it, and that's why I'm here. I had a chance to pick up this MG at a bargain the other day and couldn't resist it. Doe Tandy says I ought to get my mind off business once in a while anyway and—well, I thought I might as well try my luck to-morrow, just for fun."

"Good for you. But what's wrong with

the car?"

"Well, this afternoon when I made some trial runs over the course, I couldn't coax much more than 65 out of her. On the straightaways, the rest of the boys were going by me like I was anchored."

"Drive her into the shop," saud Gus, "and

we'll have a look,"

When Barnes had parked his little MG in front of Gus's bench, Gus climbed into the driver's seat and pushed down slowly on the gas pedal. At low speed it ran fine, but when Gus gave it the throttle, the engine seemed to get sluggish and mushy, as if it didn't want to take the gas.

"Could be the timing's off, or you may have a bum carburetor," said Gus as he checked the ignition system carefully. But a timing check showed nothing out of line. Then he went to work on the carburetor.

Again he found nothing. The fuel pressure was up, the float level was right, and nothing seemed to be blocking the jet or the fuel lines.

#### **Gus Questions Barnes**

"Any other symptoms, besides that sluggishness?"

Barnes thought for a moment. "Well, she seems to run a little on the warm side," he said finally, "but I don't think she overheats enough to cause any trouble."

"How is she on gas?"

"Well, it's hard to tell in the short time I've had her, but offhand I'd say she uses more than she should."

Gus said nothing as he climbed back into the car and started the motor again. After tromping on the accelerator several times he climbed out, put his head close to the engine block and began racing the motor by working the throttle lever on the carburetor.

"H-mm, that's funny. Sounds like there's a trace of a spark knock." He turned off the ignition and loosened one of the plugs.

"Save your knuckles, Gus, if you're aiming to check for carbon," said Barnes. "That engine had a complete carbon job before I bought it. And those plugs are brand-new."

"Hey," Gus said, with a grm, "you're knocking down my hunches even before I hatch 'em. Well, let's see if the vacuum analyzer can turn up anything else wrong."

Stan wheeled out the portable analyzer panel and connected the vacuum tester.

At idling speed, the needle on the gauge held stendy at just about the right spot to 'indicate a fairly healthy motor, However, as Gus pushed down slowly on the accelerator, the needle began to get nervous. It would go up to a high reading, snap back to a low reading, and then climb back up. As Gus increased the engine needle speed, the snapped back closer and closer to zero and didn't climb back quite so far.

"Well, you can chalk up one against Wilson," muttered Gus as he

watched the needle's gyrations. "Unless that gauge is as screwy as my last few hunches, about all that ails this car is a partially clogged exhaust system."

Gus shut off the motor, walked to the rear of the car, kneeled down, and squinted into the end of the tailpipe. Then he probed around with a long-handled screwdriver.

"You see," said Gus, "it's badly coated with carbon and the muffler's probably even worse. These MG tailpipes are pretty small anyway, so the carbon's been building up back pressure."

Gus walked over to the corner, got his

creeper and rolled it over to the car.

"Whoa, boss. You'll never make it," said Stan. "And it won't fit on our grease rack either. Wait a minute and I'll have her up on screw jacks."

When Stan had the jacks in place, Gus slid under. About a minute later he re-

appeared with a rather glum look.

That blamed exhaust system is all in one piece from the manifold right down to the tip of the tailpipe. No way of taking it apart. I'd hoped maybe we could clean it out."

"How about cutting it apart?" offered Stan.

"No. I tell you what you do, Stan," Gus said after a glance at the shop clock, "Get

right on the phone and call the Davis boys down in the city. They handle some parts for foreign cars. If they have an MG exhaust assembly tell them to stay open a little longer and I'll pick it up."

Stan disappeared into the garage office as Gus slid under the MG again.

"Anything I can do to help?" Banker Barnes sounded as worried as if a million-dollar investment had gone sour.

"Nope," came back Gus's muffled voice, "I just thought I'd get a head start by disconnecting the exhaust from the hangers."

Gus was working away at the last rusty bolt when Stan's face

appeared under the car. "No luck, boss. They haven't any in stock and claim it'll take at least a week to snag onto one."

"Well, I guess that scratches me from the race," the big man said glumly as Gus reappeared from under the car.

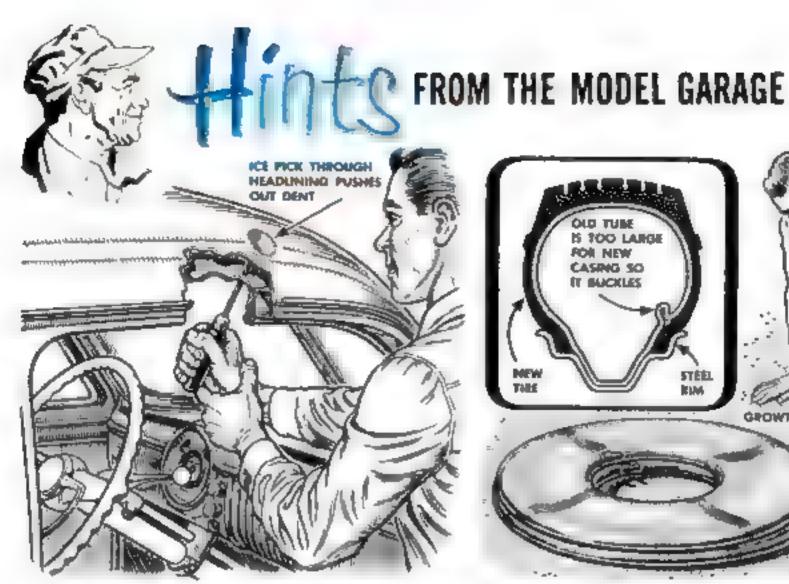
"Now hold your fire a minute," Gus kidded. "Stan, roll the acetylene welding rig out back while I unlatch the front end of this exhaust system."

A few minutes later, standing in the open lot back of the garage, Barnes and Stan watched while Gus propped the MG's onepiece exhaust up on an old metal drum so that the manifold end was high in the air while the tailpipe was on the ground. Then

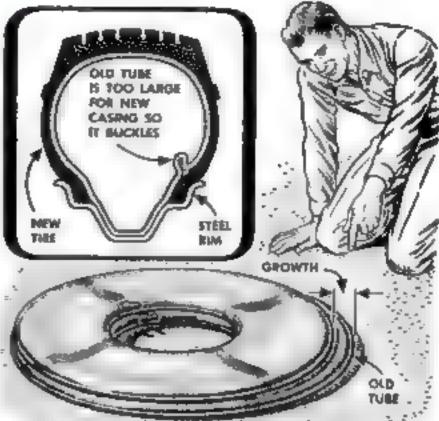
GAS BUGGY DAYS

THE first agitators for improved roads in the U.S. were the cyclists. In 1900, the bicycle brigade was 10 million strong. At that time only 8,000 automobiles were registered in this country.

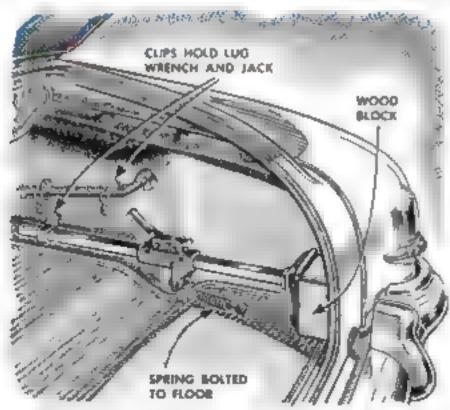
[Continued on page 248]



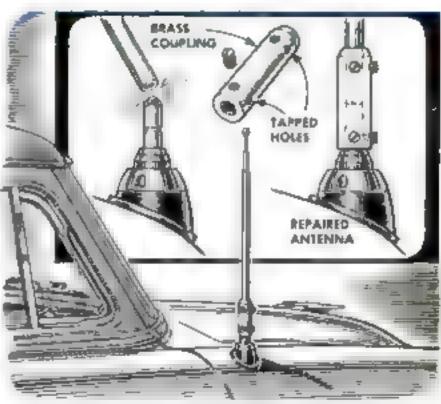
A small dent in the top of a car can often be pushed out by pressing a blunt ice pick or knitting needle through the headhning and tapping up. Then scratch the material around the hole in the headlining and fuzz it up to remove traces of the hole.



Because rubber grows in use, putting an old tube in a new tire may not be a good idea. New tubes usually are smaller in cross section than the same size casing to allow the tube to stretch into place inside the tire. An old tube may become pinched.

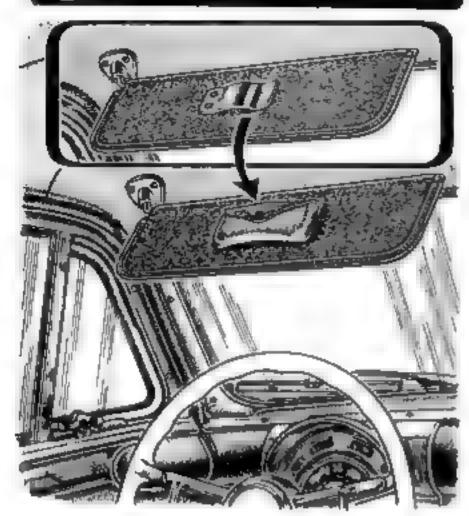


Rattle-free jack storage is easily provided. Attach two pipe straps to the trunk side with self-tapping screws, canting one in relation to the other so you'll have to press the wrench in place. Mount a spring to keep the jack butted against a wood block, with the shaft resting in a metal clip. Use the block as a wheel chock.

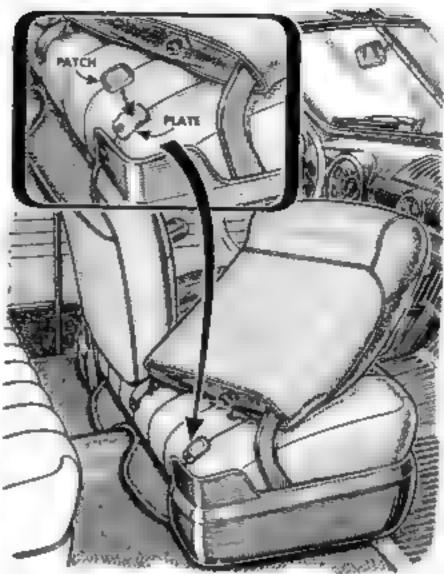


If an antenna is broken by mischievous children or overhanging tree limbs, it can sometimes be put back into service by making the repair illustrated here. The coupling might be made from a piece of brass, which makes a good electrical connection. Setscrews turned into the tapped holes will keep the two aerial sections together.

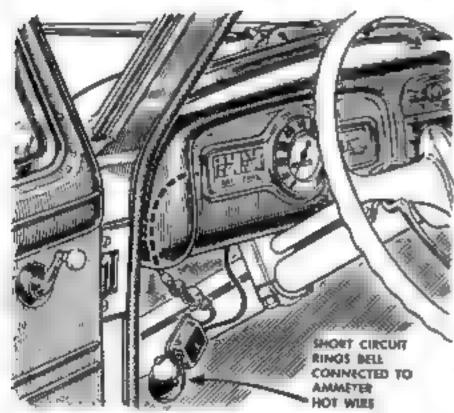
#### MORE Hints from the Model Garage



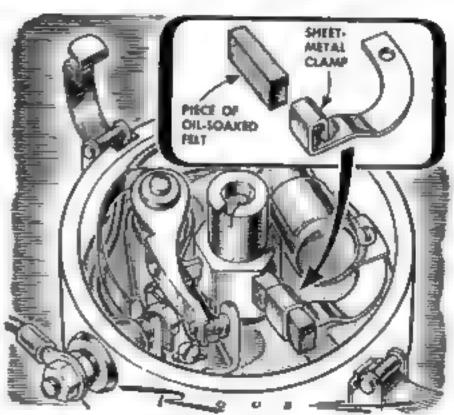
A rectangular piece of metal with one end screwed to the sunshield makes a handy clip for your sunglasses. Just slip the case on the clip. Sheet brass or aluminum might be used for the clip. Polished with steel wool, either metal will look good.



An annoying rattle may develop in the passenger seat of late-model Fords which have a small metal plate and limit bolt as shown here. The rattle usually can be eliminated by applying a ready-cut tire patch to the metal to act as a cushion.



A short in the wiring of an old car is sometimes difficult to hunt down because it is intermittent and unpredictable. If that happens to you, try connecting a doorbell in series with the hot lead to the ammeter and systematically bouncing on the bumper and wiggling the wiring until the sound of the bell leads you to the short.



Ignition troubles are sometimes traced to rapid wear of the fiber rubbing block that actuates the ignition points in the distributor. This wear can be reduced by keeping the cam lubricated. A felt order held in a sheet-metal clamp is one way of doing this. Apply a drop or two of light oil to the felt.

### Gadgets for Your Car

#### Rubber Bumpers Prevent Door Scratches



BE A good neighbor on the parking lot by installing Dorsayers. These will keep adjoining ears from being scratched or dented when your doors swing open. Made of stainless steel with rubber tips, the guards also help keep paint from being chipped off the edges of the doors of your own car. Par-Style Products, Berkley, Mich.



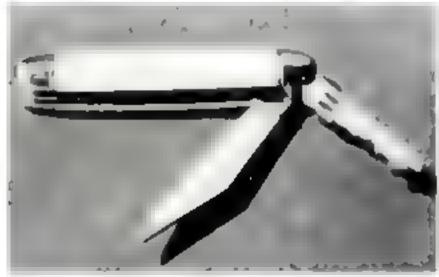
#### Meter Uses Pendulum Principle



A NEW accessory, the PerfOMeter, utilizes an old principle of physics to tell you how your car is performing. A pendulum, suspended in oil to damp its action, swings back on accelerating, forward on

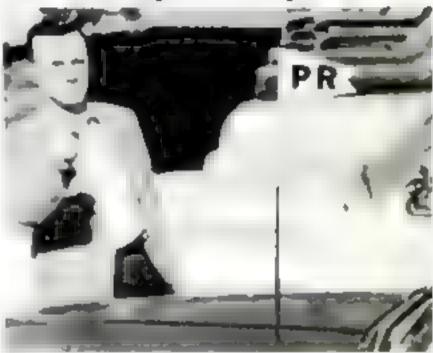
braking. This action is transmitted to the accessory's indicator needle and interpreted by the dial. For use, the meter is clamped on the steering column or instrument panel. It is self-contained and is not connected to the car in any other way. Autosphere Corp., 551 Fifth Ace., New York, N.Y.

#### Pocket Knife Has Spare Key



A spane ignition key can now be carried in a handsome pocket knife. A brass key blank furnished with the knife can be easily cut to fit any car. Ross Associates, Box 3107, Baltimore 28, Md

#### You Can Spot It Anywhere



An INITIALED flag on your car aerial will enable you to spot your car at once in a crowd. The flag is made of aluminum in pennant style and will be stamped with your initials, Cal-York Products Co., 909 Park Ave., Rochester 10, N.Y.

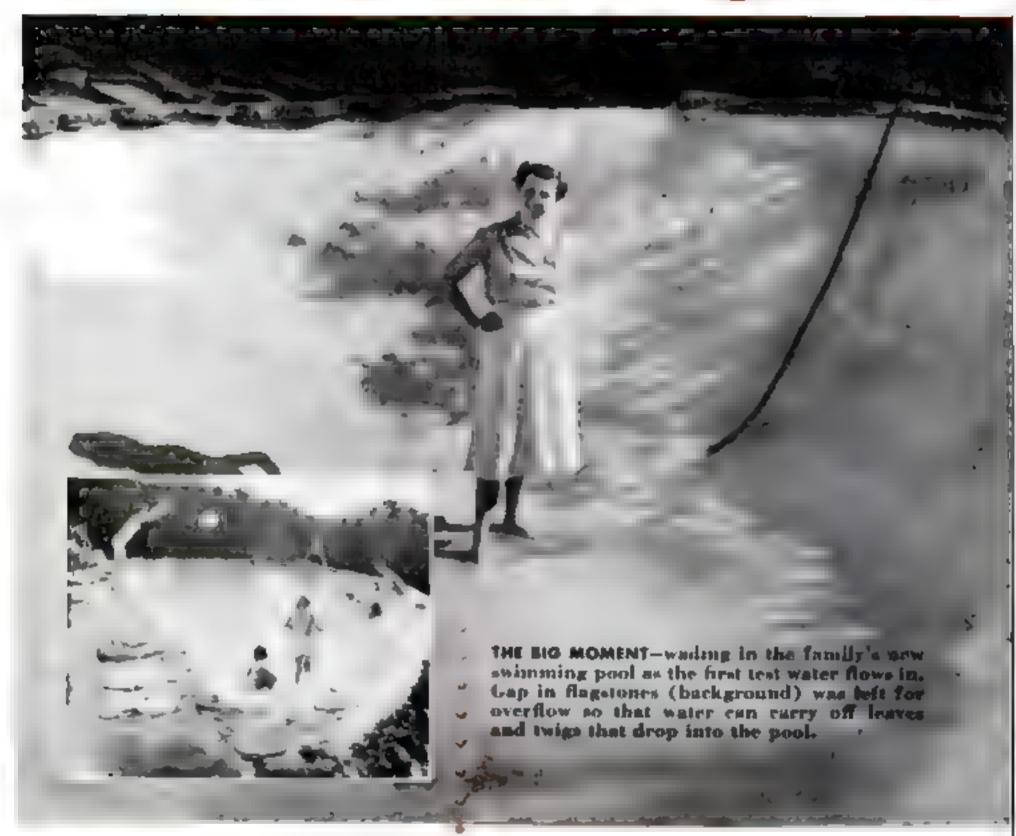


#### New Breather Cleans Intake

Hor engines are claimed to start quicker with a breather on the intake manifold to clear out waste gases and allow the new fuel charge to reach the cylinders. The inch-long unit has a brass body, alu-

minum cooling head and stainless-steel ball valve. Hellings Co., N. Hollywood, Calif.

# We're Swimming in a



#### THE HOUR BUDGET

This includes the time—ours and that of friends—put in after the excavation was finished. No hired hands were used.

hired hands were used.	1115/114 (1.
Placing drain and reinforcing steel 2 men for 4 hours	man-hours
Mixing and placing concrete 4 men for 15 hours60	**
Hauling and setting flagstone.  2 men for 10 hours20	
Putting on white coat: 2 men for 8 hours	-
Sanding white coat 2 men for 2 hours 4	-
Putting walkway along one edge: 2 men for 5 hours	24

118 man-hours

#### THE DOLLAR BUDGET

1,000 sq. ft. of reinforcing mesh	35.50
1.200° of %" reinforcing rod	54.00
Drain and pipe	8.30
18 yards of sand and gravel	63.00
82 sacks of cement	95.12
16 gailons of Novamix, plus freight.	31.11
4 sacks of white sand	3.60
2 sacks of white cement	8.60
Pickup load of sand for mortar	1.00
det de la companya de	300.43

## Homemade Pool

By Paul Corey and Darrell Huff

Since we don't miss that expensive Hollywood-style treatment, we have just as much fun as in a professionally built job.

FINISHING the concrete pour on our home-built swimming pool, described in PSM last month, put us past the halfway mark of our construction job. But we knew we still had a pile of work between us and the first splash. For one thing, the whole interior of the pool had to be finished with a white coat of mortar. Before starting that, however, we had to install the coping around the edge so that there would be no danger of spoiling the white coat by spilling mortar on it.

Coping with the coping. Some kind of coping is a customary part of a pool but hardly essential. We added one for a trim appearance and also because it gave us a chance to level the pool top, make it several inches higher and, by providing an overhang, reduce loss of water from the splash-

ing of swimmers.

We used something like a ton of flagstones that we were able to obtain free for the hauling. Brick is also sometimes used. So is cast-stone coping, which is the neatest of all, but enough to do our job would have cost just about as much as the whole pool did.

We laid our flags all around the pool except for skipping about 3' for an overflow outlet to carry off some of the leaves and other floating material that is bound to fall into an outdoor pool. We set the flagstones in a bed of mortar (one shovel of cement to three of sand) and used the same mortar to fill between them. We kept them fairly level by sighting along our level-on-a-tripod but didn't take the time to try for a slick and professional job. We wanted something of the rugged look of a natural pond anyway.

We placed the flags to slope slightly away from the pool and let them overhang the inside by an inch or two. This gives something for a swimmer to take hold of and

also cuts down splash.

The white coat. Traditional way to give a pool a smooth finish and make it more nearly watertight is to trowel on k" of sandand-cement mortar. Then, to get a pretty pool, you paint it. The cheapest paint to use is ordinary Portland cement paint, which can go on right away. More costly but much more durable are rubber- or vinyl-base paints; these go on after the pool has cured for at least a month and then has been thoroughly dried.

The trouble with painting is that it leads to repainting. To get around this the pro-



ROUGH FLAGSTONES were set around the rim of the pool, both for looks and to keep down splash. As in the original survey, a bomemade transit—carpenter's level on a camera tripod—was used to level the rim.



CORD connecting level points established by the transit kept the flags in line. Edge of pool concrete was wetted, sand-and-cement mortar put down, flags bedded and more mortar put between them to make an even paving.



scraping the rough coat of cement with a square-end shovel knocked off projecting gravel and mortar spilled during coping job, was essential in preparing for white sacking coat. Next, pool was swept clean with broom.

WHITE COAT was poured on the concrete base after it was thoroughly wet. Final cost was soupy mix of two parts white sand to one of white cement. Note roughness of base—authors say not to worry if yours is no worse.

fessional pool builders now favor a special white coat of which the basis is white sand and white cement. This is applied with a trowel and often is a two-coat job. Properly done you get a very smooth pool that is gleaming white and gives filtered water a turquoise color. However, we were told that using this material would make it necessary to hire a trained plasterer.

While tossing these alternatives around we were lucky enough to run into a fellow named Otto Burgmeier, who operates a swimming-pool maintenance-and-equipment service in our neighborhood. He told us a trick he had learned that sounded—and proved to be—ideal for amateur use. He called it sacking.

By the time we'd finished the coping job and rested our bones, the concrete had had several days in which to set. During that time we had kept the surface damp for better curing by sprinkling it with water frequently.

Sacking consists of applying a thin coat of mortar made by mixing one part of white cement to two parts of white sand and adding enough water to make a heavy paste. We used four sacks of sand and two of cement. These white materials are not hard to find since they are commonly used in laying glass block.

We applied the white coat by dumping a shovelful of the pasty mixture onto the dampened surface of the concrete and

spreading it around with a pad of burlap. Then we rubbed the stuff in vigorously to fill all hollows and rough spots.

The burlap wears out quickly and must be replaced, so be sure to have a couple of clean gunny sacks on hand when you start the job.

Otto told us to go back over our job after a little while and rub off the rough spots, but we didn't get a chance to do that. Instead we sandpapered it the next day. We simply rolled up a couple of belts discarded from our belt sander and gave the whole surface a quick rubdown. The result is a nonskid finish that seems to be working out very well.

Siderealk. Some kind of walkway around a pool is pretty nearly essential, and we put in the easiest kind. (You're going to suspect that we do everything the lazy way, and you're going to be right.) We simply cut out earth for about three feet from the flagstones and filled the cut with concrete two or three inches thick. To prevent rain water and dirt from running into the pool, we made sure to slope the walkway away from it.

We troweled the sidewalk surface reasonably smooth and, after a couple of hours, dragged a broom across it a few times to produce an attractive nonship surface.

While we were about it, we hollowed out a spot in the earth at the shallow end of the pool and plastered it over with concrete to



GUNNY SACKING was used to spread the white cont evenly, forcing it into holes and rough sputs of the undercost. If you value your hide, wear gloves—suthors found the heavy rubber kind the best.

sacking maif bone, here's how the pool looked. Sacking method gave good results and required less skill than usual troweling. It also used less of the expensive white sand and white cement.

form a tiny foot bath. A foot of 1" pipe with an ell on it forms a drain in the bottom. The water can be changed as often as necessary, or even flow through continuously when the pool is in heavy use. We figure the foot bath will cut down the amount of sand and soil tracked into the pool

Philip Ilsley, president of the big pool-building Paddock Engineering Company, had advised us to give the concrete from three days to a week to gain strength before putting the weight of water on it. We came close to the latter figure for safety, meanwhile keeping the pool damp as much as possible for better curing. Then we began to fill the pool—a great day, you can take it from us. Once we started we kept the water flowing continuously until the pool had reached its capacity.

What about a filter? We don't have a filter system for just one reason: approximately \$750. For the present, we are satisfied to operate our pool on a fill-and-draw basis

To use the fill-and-draw method you must, however, have some way to dispose of the water when it gets dirty; preferably you should have a use for the water. We simply gravity-drain ours and use it for irrigation.

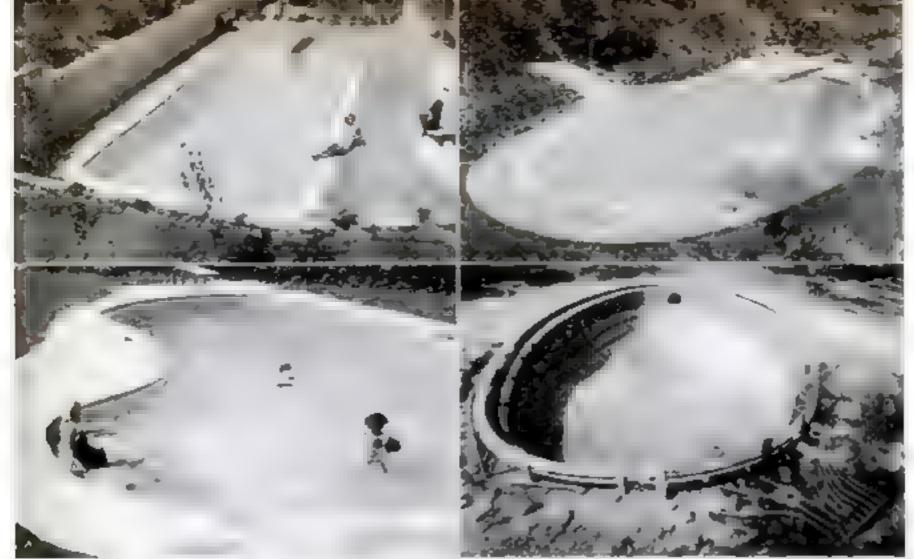
We accept the fact that a filter system is worth the cost and probably is, over the years, the only feasible way to operate a pool and get full and easy use of it. Lacking that \$750, we plan to get to work shortly



SANDPAPER—a medium belt discarded from a belt sander—smoothed the final surface. Authors say they should have given the white coat a second going-over few hours after it was put on to make surface even smoother.

WALKWAY, about 4' wide, was set in behind the flagstone coping. The bank was cut back and served as the outside form, while flags were the inner form. Walkway slopes away from the pool to carry off rain water.





PRITTY—BUT EXPENSIVE—these professionally built pools can give the amateur some good design ideas. Rectangular pool, top left, shows the most common shape, has vertical sides needed for diving. Heart shape of the pool below it is easier for the amateur to build, as well as being often more attractive. Oval pool, top right, fits particularly well into

formal garden setting. Ultimate luxury is a heated pool like the half-built one shown at lower right—but it's no job for an amateur. Heating pipes must now be covered with reinforcement and Gunite concrete, which has to be hosed on under pressure. It costs about as much money to heat a pool as it does to heat a house.

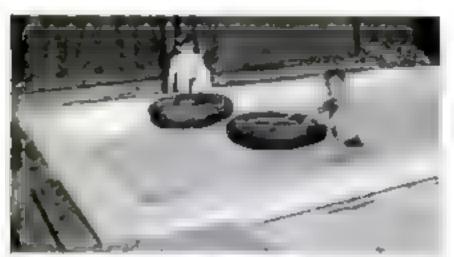
and see if we can build one. We think a big box full of sand and gravel put down in layers, along with a pump and motor and some pipe and valves will do the trick. We have a hunch that a couple of old washing

machines will provide most of the parts we need. But in the meantime we're mighty happy with our home-built swimming pool—and so are all the kids in the neighborhood.

#### The Kids Can't Crack Our Glass Swimming Pool

I'm no goldfish, but every day I go swimming in a glass pool. What's more, I built it myself in the yard with the gleeful help of my seven-year-old son and his friends. But the pool is made of the glass that goes into armor-tough auto bodies, not aquariums—glass-fiber cloth, impregnated with a plastic resin.

We started by building an 8' by 12' wooden coaming-like a huge picture frame.



204 POPULAR POTTICE

This we laid on the ground at the site. Then we dug out 30" of dirt right up flush to the inner edge of the frame, leaving smooth vertical walls and flat bottom. I laid three layers of asphalt building paper on the bottom and one on the sides. Finally, we covered bottom, sides, and coaming with glass cloth and plastic. The heavy soil holds the sides with no other support.

We fill the pool with a garden hose, using house water run through a homemade filter. A small power pump empties it and the water goes to the garden. A tiny dose of copper sulphate keeps the pool free from algae, and for sanitation we add chlorine bleaching fluid each day that we decide to use the pool.

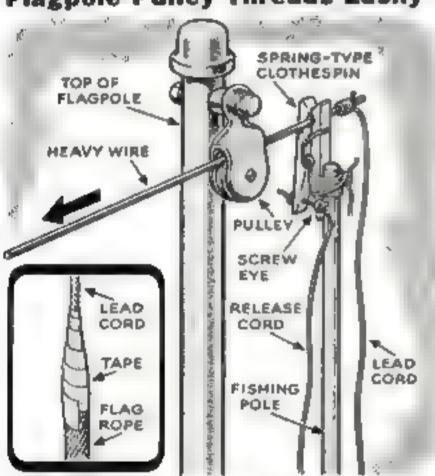
When the pool is not in use we cover it with a couple of plastic dropcloths sewed together. This keeps out dirt and stray animals.—H. E. Biggs, San Leandro, Calif.

#### Kit Improves Phonograph



You can modernize your record player with this high-fidelity kit designed for easy hookup to any phonograph. The kit includes two pickup cartridges, for regular and slow-speed records, preamplifier and adapter head. Instead of generating its own current, the pickup has a steady current fed to it from the preamplifier. This is said to permit the needle, relieved of being its own generator, to follow the record grooves more faithfully. Pfanatical Chemical Co., 104 Lake View Ave., Waukegan, Ill.

#### Flagpole Pulley Threads Easily



You can start a rope through a flagpole pulley without climbing to the top of the pole if you use this method. Use the setup shown in the sketch above. After the heavy wire is pushed through the pulley, pull the release cord to open the clothespin. The wire will drop, pulling the lead cord through the pulley. Then the the flag rope to the lead cord and pull it through. If the rope doesn't slip easily into the pulley, taper the spot where cord and rope join with tape, as shown in the inset.—Henry S. Rorer, Norfolk, Va.

#### **Bumper Protects TV Door**



When the door of our TV set is open, it sometimes touches the rough brick of the fireplace. To protect the door's finish. I cut a section from a red rubber car-washing sponge and pasted it over one of the bricks with rubber cement. The bumper is inconspicuous and keeps the door from being scratched—J. G. Voelker, Baltimore.

#### Wheel Makes Cover for Dry Well

NEEDING a new cover for my dry well. I used the wheel of an old hay rake as both the reinforcing and the form for the concrete. Sheet metal was wired to one side of the wheel and a length of chain was looped through the

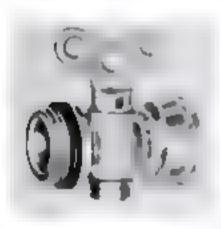
spokes. Then the wheel was laid over the well, sheet-metal side down, and the concrete poured. The chain will serve as a handle if I ever want to remove the cover.—

T. H. Lavengood, South Bend, Ind.





1. Tiny Pump Drains Cellar. You use water to get rid of water in this inexpensive pump for draining flooded cellars. Connected to a faucet by a short length of garden hose, Drainmaster uses the pressure of water flowing through it to pick up additional water from the cellar floor, carrying it down a drain or out a window through another hose. It will lift water about 6' and handles 300 gallons an hour.



2. Valve Shuts Off Hose. Hook this valve to your garden hose and you can turn the water on or off from any point in the yard without going back to the house faucet. It fits all standard hose

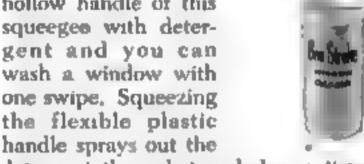
couplings and can be connected between the nozzle and the hose or between any two hose sections.

4. Rubber Cushions Cabinet Catch. Cupboard doors close silently and stay tightly shut with this new latch. A metal



plunger on the door slips into a neoprenerubber cylinder on the cabinet. The neoprene grips the plunger firmly, keeping the door from bouncing, banging or springing open.

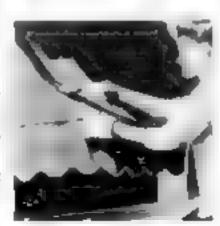
3. Squeegee Holds Cleaner. Just fill the hollow handle of this squeegee with detergent and you can wash a window with one swipe. Squeezing



detergent through tiny holes in the rubber blade, and the squeegee wipes the window clean.

5. Paint Weatherproofs Canvas. Awn. ings, lawn furniture, beach umbrellas and other canvas articles that have become

faded and leaky can be restored with this special paint called Setfast. It provides a tough. weatherproof finish, is flexible to prevent cracking and comes in a variety of colors.



206 POPULAR SCIENCE

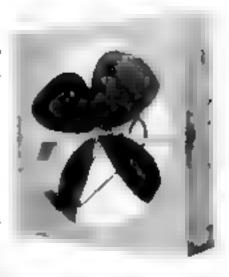


6. Roller Paints Window Sash. You get paint on the sash and not on the glass with this small window roller. Paint is poured into the metal cone and seeps out gradually through a felt pad as it is rolled along. A metal disk at the tip rides against the windowpane to keep paint off the glass.



7. Tray Pastes Wallpaper. No more measuring, cutting and messy pasting of wallpaper, say the makers of this pasting tray. Just fill the tray with paste and plop in a roll of paper. As you pull up each length, it comes out pasted, ready for hanging on the wall. It's then cut off at the bottom and the next strip pulled out in the same way. The Paperhanger is also said to eliminate tearing, folding and overpasting.

8. Kit Builds Fan. Everything needed to build a 80" home exhaust fan except the motor is included in this inexpensive kit. It contains four paddle-like fiberboard blades that bolt to a special hub, two pulley wheels, bearings,



belt and hardware. Any 1,725-r.p.m., %- or %-hp. motor will drive the fan, and faster motors can be geared down. The fan can be placed in a window or attic opening and is said to move 5,600 cubic feet of air a minute.



9. Cleaner Scrapes Paintbrushes. A metal screen in the bottom of this can of brush cleaner lets you scrape the paint off

bristles as it's loosened by the cleaning fluid. The raised screen permits the old paint to settle to the bottom, away from the brush, and also forms a platform to hold soaking brushes in the fluid. The Paint-Trap cleaner comes in quarts and gallons and can be re-used many times.



Further information on these products can be obtained from: I Burson Laboratories, 951 Willard Court, Chicago 22; 2. Media Distributing Co., 420 Lexington Ace., N.C. 11; 3. Holi's Gift Shop, 127 So. Dubuque, Iowa City, Iowa, 4. Laboratory Equipment Corp., 5t. Ioseph, Mich., 5. Interchemical Corp., 224 McN horter St., Newark, 5.1; 6. Stender Products Co., 259 Strader Ace., Circinauts 26. . Hastings Products, 141 fifth Ace., 5.70 Io., 8. Fan Alt Co., P.O. Box 5812 Memphis 4, Tenn.; 9. Klein Strip Co., P.O. Box 3565, Memphis 6, Tenn

# Plastic Pipe Makes Anyone a Plumber



SAW OR KNIFE will cut plastic pipe. No need for a special tool, and no reamong is needed after the cut.



it bends easily. One of the conveniences of plastic pipe is the case of assembling complex hookups. The writer eventually clamped this assembly to ceiling of home darkroom.

So light that even the youngsters can tote it around, this flexible material will not break your bank either.

#### By E. F. Lindsley

HOME plumbing jobs have always required a bit of know-how, and always will, but flexible plastic pipe makes them a lot easier. If you have a big plumbing job coming up, you may save time and money in large chunks by using this tough light-weight material.

With it, you can drop a jet-well hookup down the casing and be pumping water before the hoising rig needed for metal pipe could even be set in place. If you have dreamed of an underground lawn-sprinkler system, plastic pipe is just the ticket. No need to worry about freezing, for ice just stretches the pipe a bit.

For the man who wants to tie a new outdoor hose connection, a home darkroom or a water softener into the house cold-water system, plastic pipe beats the problem of pipe cutters and threading tools needed to dodge metal pipe around basement obstructions. It bends easily around curves, and any saw or sharp knife will cut it.

What is it? Technically, plastic pipe is extruded polyethylene. It weighs about an eighth of its equivalent metal pipe, comes in standard pipe dimensions in coils containing up to 400 unbroken feet, and is absolutely inert with respect to drinking water and a long list of solutions and chemicals.

For the home user, the last point means no "pipe" taste in the water, and, even more important, no expensive replacement jobs every few years. With plastic pipe, rust, scale and electrolytic corrosion just don't enter the picture. Connections, either into conventional metal pipe or plastic-to-plastic, are made with molded hard-plastic fittings that are forced into the ends of the pipe and held permanently by stainless-steel clamps. Plastic to metal fittings

special fittings are made of rigid plastic. Stainless-steel clamps draw plastic pipe down on serrated ends of fittings, making leak-proof connections. Fittings with threaded ends permit connections to standard pipe fittings. Other fittings include reducers and plugs, all matched to standard pipe threads.



have standard pipe threads on one end for ease in making the joint.

Vot for hot water. Plastic pipe at present can't be used for steam lines, or where water temperatures may exceed 160° F. This usually rules it out for domestic hot-water lines, unless it can be made certain that the water heater will never deliver temperatures above this point. And while automatic water heaters are often set at 135° or 140°, the below-160° restriction could be a handicap with future dish- and clothes-washers, which sometimes require very hot water.

Since plastic pipe suffers some ill effects from prolonged exposure to direct sunlight, it should be covered at least lightly when installed outdoors. It does not deteriorate underground.

Although the pipe will merely expand when water freezes inside it, alternate freezing and thawing eventually may burst it. Plastic pipe, incidentally, can't be thawed by an arc welder since it is not a conductor. Its insulating properties are so good, in fact, that some utility companies use it to shield men working among 4,800-volt high lines.

Will it do your job? Answering this won't take much head scratching. Tests have shown that bursting pressures range from 540 lb. per square inch for "" pipe to 200 lb. for 1" pipe, about as small and as large as pipe comes in most houses. Normal city or well-pump pressures don't come anywhere near these values. Since the stuff stays flexible to minus 40° F. and lower, you haven't any wornes on that score. Laboratory tests indicate a working life of easily 30 years

How much? Plastic pipe costs less than copper tubing, about the same as galvanized metal, and if its flexibility and easy go-together permit you to do the job yourself, you'll beat the cost of that much professional cutting, reaming, threading, and wrench pulling.

Even though it isn't recommended for hot-water systems, plastic pipe has been found to be just the thing for radiant heating because it is jointless and



HOME APPLIANCES like this water softener can be hooked up in minutes with plastic pipe. Persons living in rented property and owning the apphances can therefore move them.



JET-WELL HOOKUP is far easier with plastic pipe. Insert adapters join the two lengths of plastic pipe to the jet. Threaded connections here are scaled with Permatex No. 2. Other standard pipe dopes are not recommended on plastic fittings. After jet is connected, the pipes allde easily down the casing. Well easing also is now being made of hard plastic.



easily formed into the necessary loops and coils. Here, as long as temperatures are kept below 160° F., all is well.

It's ideal for wells. One job where plastic pipe reigns supreme is on a jet-well installation. If you have tried to juggle a jet on the end of a double length of heavy pipe, lower it into a easing, and hold it while new pipe sections are upended and threaded into what you hope is a leakproof

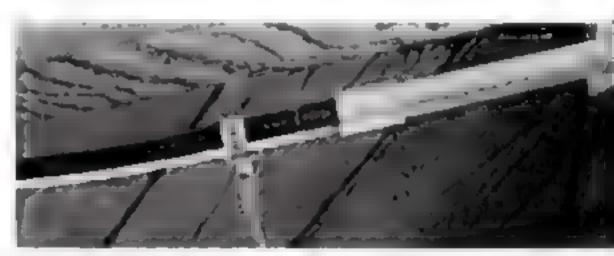
coupling, you know that there are easier ways to enjoy life. Pulling the pipe to make repairs is even meaner, particularly if the pipe joints are rusted solid.

All too frequently in metal pipe high friction and scale team up to throttle pump output way below capacity. Naturally, the overworked pump has a shortened life. Plastic pipe, weighing only eight lb. for every 100 lb. of metal pipe, makes the whole

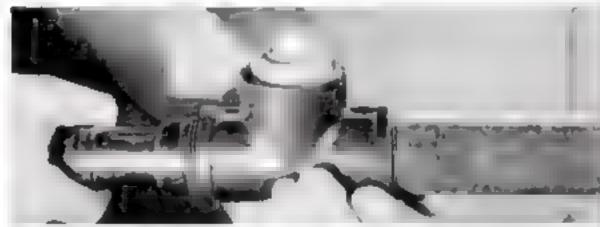
#### **How Joints Are Made**



LENGTHS OF PLASTIC PIPE are joined by clamping their ends on notched ends of an insert coupling or, as in above photo, a tee. A scaler is not needed to make joints watertight.



METAL TO PLASTIC pipe connections require no plumbing know-how. In photo above, a metal coupling receives male threads of galvanized pipe and the hard plastic insert adapter. Plastic pipe is then slipped over end of adapter and clamp tightened.



HARD PLASTIC TEES and elbows also help make joints easy. Plastic pipe plugs are available; a metal one is shown here just to prove it will work.

job a breeze. The jet is coupled to the pipe, the whole works is poked down the casing to the desired depth without a hoist, and the upper ends are sawed off and

coupled to the pump,

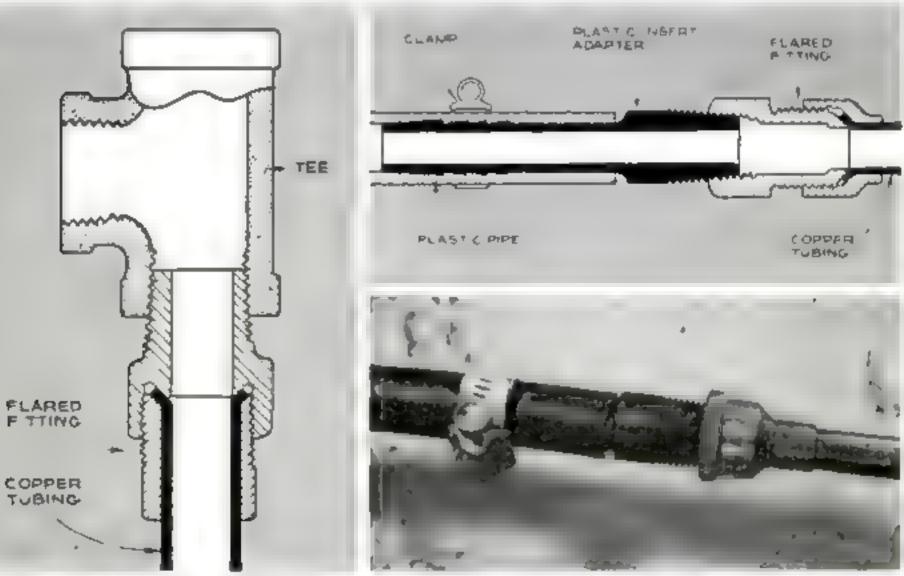
If the well gives trouble later, the plastic pipe can be pulled out intact—regardless of whether a structure has been built over the well. Jet pump installations may go as deep as 150 to 200 feet. The exact limits are established as the depth where the combined water head plus the pumping pressure does not exceed the recommended working pressure of the pipe. When you do a job like this, it is worth knowing that at least one manufacturer, the Carlon Products Corporation, of Cleveland, tests every foot of plastic pipe for eight hours at pressures well above working values.

New connections are easy. Still another break to the user comes when the pipe must go into a trench. A plow furrow often suffices. Since straightness is not important, the pipe can be suaked around where it is wanted without regard for the limiting angles of conventional pipe fittings.

At a later time, if it is desired to intercept the original pipe with a take-off to another pipe line, no excavation of full pipe lengths for cutting and threading is required. The original pipe is sawed open, a tee clamped in, and the new lead attached without fuss or bother. This feature makes plastic pipe attractive to cities for gas and water service leads, and to the farmer with plans which will require future taps into the main line.

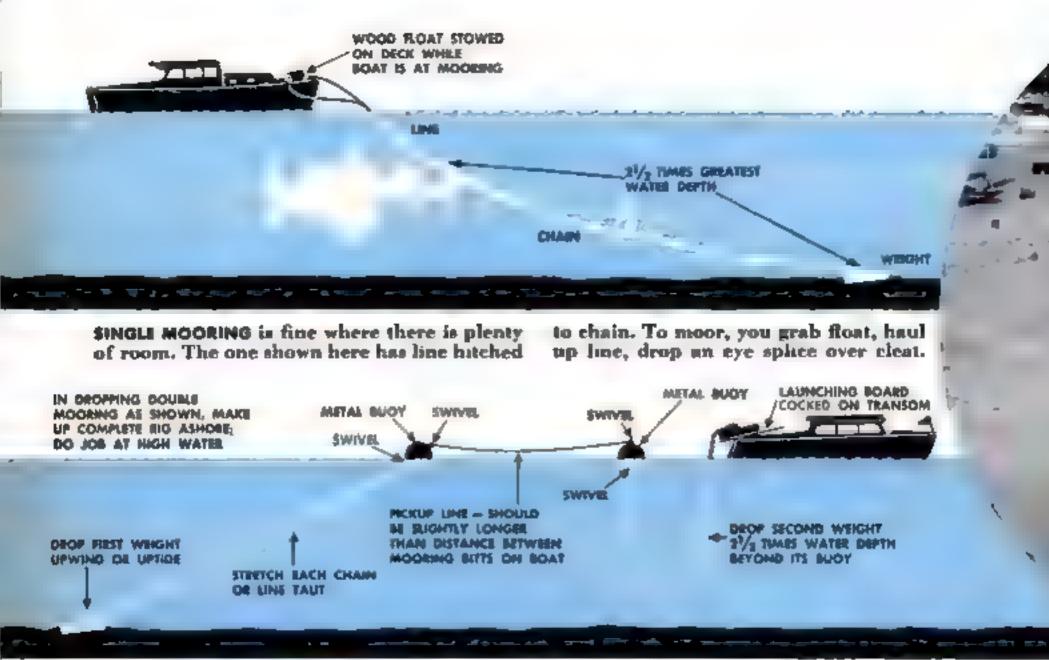
One inevitable problem of any new material is its acceptance in building codes. According to Walter S. Prendergast, general manager of one of the largest producers of plastic pipe, "most plumbing codes tolerate it rather than approve it." I find this understandable after listening to fiery remarks from an old-time plumbing boss who wiped the white lead and cutting oil on the seat of his overalls, shifted his chew, looked me in the eye, and delivered his opinions on homeowners who so much as looked for plumbing parts in a catalogue with the idea that they might do some of their own work.

From the insurance standpoint, the material is classified as "slow-burning." It is a matter of record that plastic pipe in a Texas manufacturing plant did burn through and release its water, extinguishing a fire that threatened the plant. From this, it would seem that plastic pipe carrying water through your home might also serve as a thermo-triggered sprinkler system.



COPPER TUBING can be joined to plastic pipe with either flared or sweated fittings. The sketches show two uses of flared fittings. The

photo shows how a sweated-on female connection can be used to receive the male threads of a plastic insert adapter.



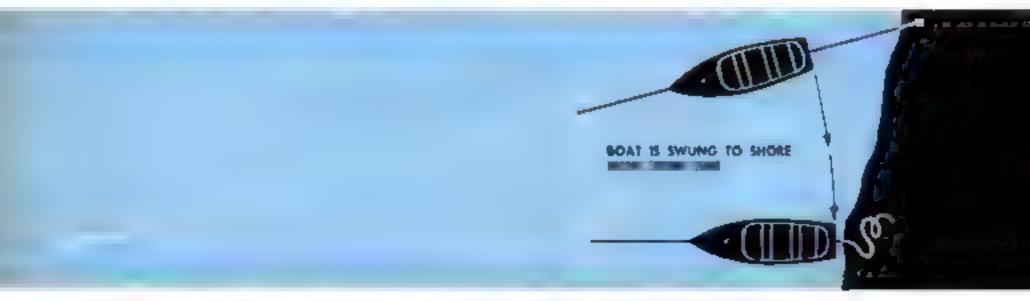
DOUBLE MOORING, bow and stern, is essential where space is limited. Moorings shows have

chains connected directly to metal cans. Bout ties up by running a line through ring on can-



PULLEY RIG enables you to moor bost out in deep water, pull it ashore when you want it.

Lanes should be adjusted with care if there is much tide. Shore end can be tied to stake.



TEMPORARY ANCHOR MOORING puts you ashore without a dinghy, yet keeps your boat

afloat. Stern line, fastened ashore, must be long enough to swing boat out to deep water.



But choose the mooring best suited to your anchorage, the harbor bottom, local weather, and size and type of boat.

#### By Clinton R. Hull

If YOU want to duck an aching back from loading and launching your small boat every time you use it this summer, you need either a dock or a mooring. Docks with empty berths being scarce, you'll probably have to settle for a mooring.

The idea of a mooring is simple—just a big weight dumped at the bottom of a harbor, with a line hitched to a buoy that you pick up to tie up. But to be safe your mooring must be the right weight, rig and position. Here are some suggestions.

How big? Weight, anchor chain, and rope sizes vary not only with the size of your boat but also with the location, the type of bottom, and the shelter around the anchorage. Your best bet is to ask the advice of the nearest Coast Guard station, or on small bodies of fresh water, the old-timers who know the place.

What are they made of? Iron mooring weights are best-if you can get them. In the water, all objects lose roughly 62 pounds for every cubic foot they displace. Since cast iron weighs 455 pounds a cubic foot, it loses less than a seventh of its weight submerged.

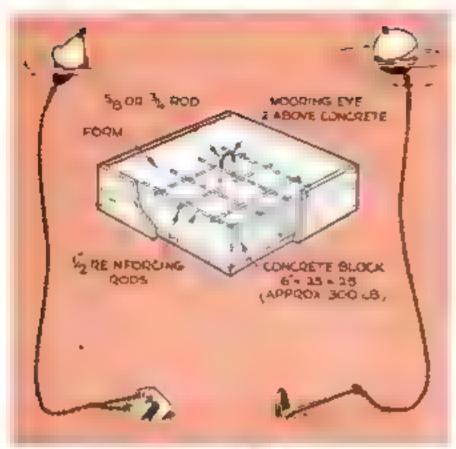
Concrete usually weighs only 144 to 150

pounds per cubic foot, so that it loses 41 to 44 percent of its weight under water. Reinforcing it with iron scrap or heavy woven wire mesh, however, can add enough weight to do the trick. Cast it in 6" to 8" slabs with a ring center-mounted. You may want to mold in handgrips. A favorite way of using concrete is to pile scrap metal in a big galvanized wash tub and then fill it up with mix.

Drop day. Mooring weights for most small craft are light enough so that two or three people can manhandle them into a skiff and over the side without shear legs or tackle. A heavy canvas sling with rope handles may help you grab hold. Be sure to set the weight on a launching board cocked up on the transom, so you can just lift the board and slide it over the stern. Drop at high water, and allow  $2\frac{1}{2}$  to three times as much chain or line as the water is deep.

How many? With the standard single mooring, a boat swings a full circle as wind and tide shift. This is fine where there's room, but for narrow quarters you'll want a double mooring—bow and stern—so you won't bump your neighbors.

What rig? You can use either a metal can fastened to a chain, or a wood float bitched to a line. With the can type, you



MOORING WEIGHT must be heavy enough to hold boat in high wind. Old engine block is favorite all-metal type. Heavy mushroom anchor holds where soft bottom lets it hed in.

must hook the can and he your boat to a ring in its tip. With the float variety, you grab the float and haul up the line which is fastened to it. The line has an eye splice in the end, which is slipped over a clear near the bow of your boat. The float is stowed on deck while you're moored. When winter comes. If you live where winter brings ice or heavy gales, you won't want to leave your mooring out. You can take off the float and drop the chain to the bottom—and spend a week grappling for it in the spring. Or you can manhandle the weight off the bottom and drag it ashore. Better than either is to remove the float but hitch a pickup wire to the mooring chain and take it ashore. Then you just row out along the wire next spring to find the chain. But if you're moored well out in the harbor you'll need a lot of wire.

Upkeep. Chain links wear. Untreated rope becomes unsafe in 10 to 15 months in the water—and after only three to nine months in mud. You can lengthen the useful life and discourage marine growths by thorough treatment with creosote or a trade preparation like Cuprinol or Cuprolignum Reversing bow and stern lines occasionally on double moorings increases their life.

The chain should be cleaned periodically and given a coat of asphalt-base marine paint. Paint the underwater sections of a can buoy too. Do not use copper paint on galvanized metal—and be sure that your buoy and chains are galvanized if your mooring is in salt water or water with a high mineral content.



in JUNE for burglars. FBI Chief Hoover says there are 47 burglaries every hour each day in the U.S. Thieves like to work undisturbed, as they can when you're on vacation.

the burglar has is the careless homeowner. Accumulated milk bottles, newspapers, and mail all invite thieves. Before you leave on vacation, stop all deliveries by mail or phonemot by a telliale note in milk bottle or mailbox. Lock every window and door. Put valuables in a safe-deposit box. Have the lawn mowed while you're gone. Leave shades up and tell neighbors and police you will be away; then a light in your house will alert them. And wait until you get back to have the local society editor write up your trip. Burglars love to be notified in advance.

EXTRA WIDTH of rails at after end acts as planing surface to help boat ride higher, carry heavier loads faster.





AT FULL SPEED, rail-equipped outboard throws little how spray, even with weight well forward. Rails are frequently used on large inboards as well as on small craft.

## How to Add Splash Rails to an Outboard Boat

UNTIL I put on these splash rails, a full-throttle run in my boat was a dampening experience. The bow kicked up a wall of spray and the wind blew it right in my lap. On a gusty day, I really got a shower.

Now the rails keep me dry. Fastened just above the chine line where the bottom meets the sides, they catch the spray and deflect it downward. They also serve as rub rails and help the boat ride better.

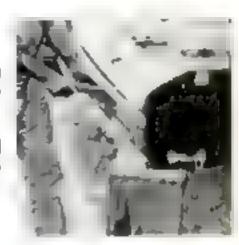
The rails are 1" by 2", but since a piece that size would be hard to bend, I built each one up from two strips 1" square. The first is screwed to the boat and the second is screwed on top. Having a plastic hull with no frame, I had to screw the first strip on from the inside. With frame construction, you could screw it directly in from the outside.

I used ash, but any tough, bendable wood will do. The rails are planed to a point at the bow and squared off at the stern.—Clinton R. Hull, Costa Mesa, Calif.



CURVE IN RAIL is made by fastening stern end and bending how end down against spacer blocks bearing on original rub rail.

second staip in screwed to first, making completed rail 2" wide. Screws are 1 34" No. 9 brass, spaced 8" apart, countersunk and calked.



## Seesaws Made of Scrap Pipe and Old Tractor Seats

Youngsters get a big kick out of these sturdy seesaws made of pipe. The center support is welded and bolted from old gas pipe, and the long teeter beams pivot on short lengths of pipe slipped

over the support arms. Metal seats from junked farm implements are bolted to the ends of the beams, and for the tiny tots,



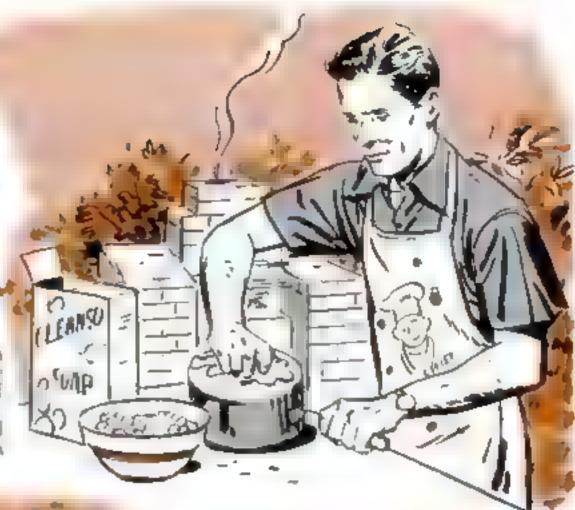
wheels from old steam valves are welded on to make handgrips.—George Simon, Phillipsburg, Kan.

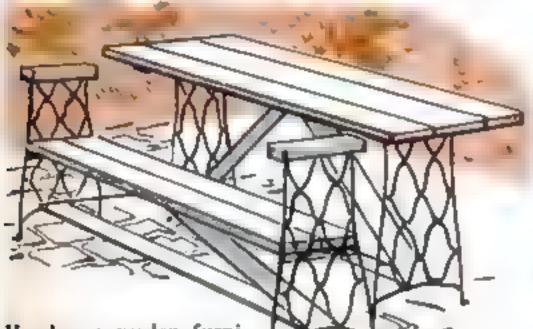
## **KEEPING THE**

## Home

SHIPSHAPE

Outdoor cooking leaves you with less of a clean-up chore it pots are first protected with a thin film of dried soapsuds. Then when they're removed from the fire and dunked in the dishpan, any soot will wash off with the soap.





Handsome garden furniture can be made from the trames of old foot-treadle sewing machines. You can salvage the iron sidepieces from dealers who accept outmoded machines as trade-ins.



Fine pot holders can be made from a discarded suit, since wool is a poor conductor of heat. Cut out squares or circles with pinking shears and stitch several together with yarn at center.

Wooden drapes dress op a wind w, can anteneed for cortains. The bandsawed plywood sections can be acrewed to small angle brackets fixed to the top of window easings and to sides of jambs.



Anchor the dispenser and you can tear off tape with one hand. For a permanent fix, turn down two screw books in table or desk until the dispenser is held firmly when slid into place. A C-clamp makes a temporary fastener.

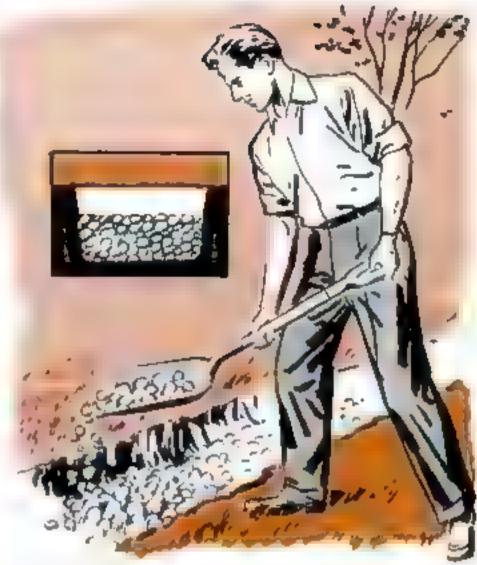


A hand pull for a small drawer is easily improvised from an alarm-clock winding key. After drilling a suitable hole, attach the key with a machine screw and a washer.



Settle the dust with a fine spray of water before beginum, in indeed pointing job. Point the spray at the floor at doing at the firm a wide area around the work spot





A buried ditch will sometimes drain a wet spot in the yard without ruining the look of the property. Dig it 21 males deep and fill about a third with slag or crashed rock. Level off with dirt, then sod or plant to match the surroundings



Wood left in the socket when a tool handle breaks can be removed like this: Saw off the wood square with the shank. Drive a heavy wood screw into the wood. Remove the retaining pin and lock the screw head in a visc. Then drive off the socket with a cold clust.

Pull-out shelves make a linen closet easter to use. Replacing cleats and heavy shelves with sidepieces dadoed 5 16" to take "" plywood trays will do the job.



Trim and colorful, this 10% by 15' terrace roof the cunvas panels. Posts can be pulled up and cost about \$50 half for the frame and half for

entire roof removed for storage in off seasons.

## Canvas Sun Roof Shades Your Terrace

Water pipe and awning fittings make a sturdy frame for canvas panels that will add a lot to your summer comfort.

ONT let that roof over your terrace. patio or porch remain a pipe dream. Build a frame of the pipe, add some canvas panels, and there's your roof-colorful, durable and inexpensive.

Ordinary water pipe does the job. If you have a good grip, you won't even need a pipe wrench; hand-tightened joints will do. No pipe dies? You can buy the pipe threaded to order. For posts up to 7' high and rafters up to 15' long, "" pipe is heavy enough. Use 1" pipe if frame members must be longer.

You will also need three kinds of standard awning-maker's fittings, shown at the top of the next page, plus canvas and cord.

Canvas comes in a variety of colors and weights. A grade good for four or five years runs about \$1.30 a square yard. White and khaki are slightly cheaper. There are also serviceable twills and ducks at about 85 cents. The better materials are water- and mildew-proofed. Canvas will last longer it painted and stored over the winter. As such material commonly comes 30" wide, it's economy to plan your panels in that width or some multiple of it, You'll also save trouble by ordering them with a hem at one end and grommets along the other three edges.-Jerru Parker, Sonoma, Calif.







Awning-maker's fittings hold pupe together. Eve end (left allowe series on par has eve to lit into my and rather haleer more conter II der dso clamps a rod at 90° to rafter Slip tee (right) has had that slides in pipe until locked by se serew. The stein is threaded.

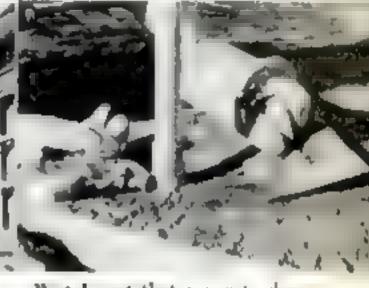
Rod and rafter holders are fastened with wood screws to one by four stringer on house will If nonrated directly on will at desired spacing, which would have been on the hoards and some on battens. On smooth will struger would not be necessary from helphars are 8' above terrace floor.

Posta can be act in deck flanges holted to a floor, or m sockets fixed in a parete. The socket above is stuply a piece I larger pipe with a har nath through its lower end to anchor it in the concrete, The upper that goes through both post and socket to lock the





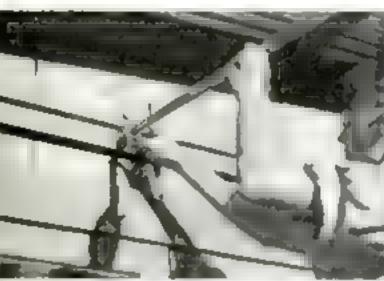




Assembly begins by screwing eve ends to the two end citters. Here sh, tees are pet on the 15 front bar. An extra tre-IS SUPSYCE I Cara otalside rdt r and shous while the tyo ends are placed in the two end holders on the wall-Finally, slip tees are screwed on the end posts

Tees are slid onto the front but and the entire assembly is their rused by one nin It will stand by itself while posts are planified Hara with setseteses on the tees tightened experience poured fround the past sockels. Recommended root patel is 1' in 10

Wateh out that concrete does not hury made that lock posts in their sockets. It it does, posts ranged by reposed to let them out for strap, expesect in ly in surply knocked out. Locking pails should not be omitted, as a high wiral could then make entire roof Like of

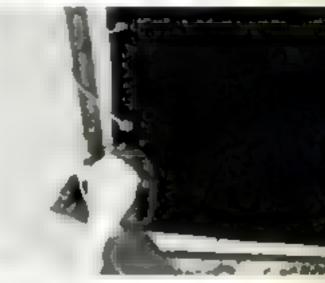




to likely ritters in screwed to the derently teen is empty put on a vide rafter ends and retains in rafter holders will be as Book hir cinvas (paradel to wat in ilso clamped in he der as in trial assembly shown these



Canvas panels, hereigh d in end in support of the rod in this case is by cight of "pape Das is falser those the from south dear of the Life it is out spar. The a paper is the resemble and root and ratter borders with wing with is shown in the previous of learning



Panels are lashed to the rafters and Iront bar with Veneto be a cord through great mets set along two sales along te nt til ibnat evers 7" Sinzi or jolds two parels t as le med the rad or last mades rate riser if the ends of the end are list sezed with he is a fire of



# You Can Handle the Humidity

These home setups show how machines and thirsty chemicals can blot the air.

## By Kenneth M. Swezey

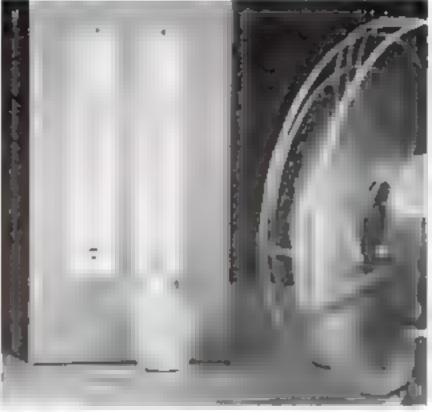
YOU'RE right, it's the humidity. It's the humidity that leaves you gasping after a five-block walk in the sun, with your shirt stuck to your back. It's the humidity that makes your cellar shop and game room dank and unlivable. It's the humidity that rusts your tools, mildews your camera, and turns

your winter shoes into fur-green slippers-moldy green, that is.

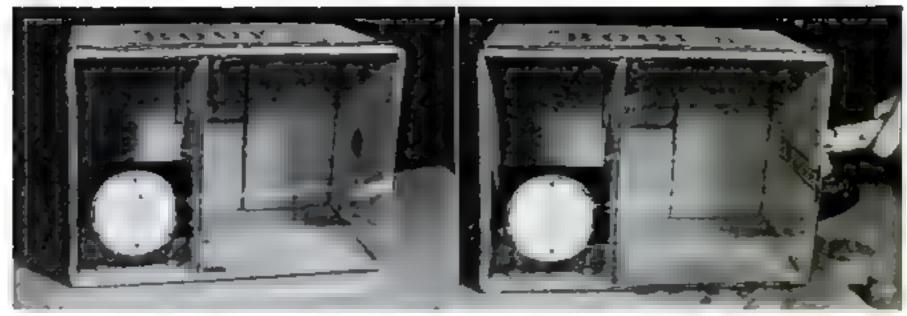
Until fairly recently, all you could do about the humidity was cuss at it. Now you can buy chemicals that drink up moisture in closets and tool chests, or a portable mechanical dehumidifier that will wring water from the air of a whole room, Here's how they work.



Looling air below its dew point squeezes out the moisture—that's how a mechanical dehunidrher works. You can find the dew point of the air at any given time by a simple experiment. Add ice water, as shown above, to a third of a glass of water at room temperature, stirring it with a thermometer. Note carefully the temperature at which moisture first becomes visible on the glass. Stop adding water and then note the temperature at which the moisture on the glass disappears. When you average these two figures you get the dew point of the air.



A wet-and-dry-bulb hygrometer is made by hanging twin thermometers side by side. Wrap the bulb of one with a wet cloth and put the end of the cloth in a glass of water. Turn a fun on the thermometers and after a minute or two note the reading of each. The dry-bulb thermometer will give you the room temperature. The wet bulb will give a lower reading: the drier the air, the greater the difference will be between the two. The table in the next column converts this difference into relative humidity. Of course if the relative humidity is 100 percent, no water whatever will be evaporated at the wet bulb. no cooling will result, and the two temperatures will remain exactly the same. In this case you're living in a cloud.



Spraying water into the air, as some home air coolers do, drops temperature but increases humidity as the homemade test chamber above shows. Make a hole in one end of the carton as shown at left, and place a temperature and humidity indicator in the other, protected from spray by a cardboard partition. Cover the open face with transparent cellulose. Start by reading temperature and humidity when carton is filled

with ordinary room air. Next spray water at room temperature through hole for about half a minute, as in the right-hand picture, and plug it with a cork. After several minutes note the temperature and humidity again. You'll find the temperature has dropped but the humidity is up. The air has lost some of its heat in changing the water drops to vapor, but the moisture content of the air has increased.

Think of the air as a sort of gaseous sponge that can hold water in the form of invisible vapor. How much water depends on the temperature: the warmer it is, the more vapor can be held. The amount of moisture actually in the air at any time is a percentage of this maximum amount, and is called the relative humidity. For example, if the temperature is 80° F., a cubic foot of air can hold nearly 11 grains of water vapor. If it is actually holding only 5½ grains, the relative humidity is 50 percent.

Suppose the temperature drops from 80° to 50°. Now the air can hold only 4 grains of water vapor per cubic foot: 1% grains must be dumped, so that much vapor condenses into water. The temperature at which condensation starts in air of a given moisture content is called the "dew point."

Warm wet air hitting cold earth at night is chilled below its dew point and condenses water vapor on the grass. You get "dew" also in the cellar on cold-water pipes or chilly walls. A mechanical dehumidifier works the same way. Room air is chilled below its dew point by being blown across a refrigerated grid. Part of its water vapor

DRY-BULE	DIFFERE	ICE BETT	NEEN WET	AND DE	Y BULBS
TEMP.	30	6"	9.	12*	15*
(DEG. F.)		ELATIVE	HUMIDITY	(PERCEN	1)
50	_ UT	62	44	28	12
60	84	68	53	40	27
70	_ 86	72	60	48	37
60	87	76	64	54	44
90	89	78	84	59	50

condenses and goes down the drain; the dried air is blown back into the room.

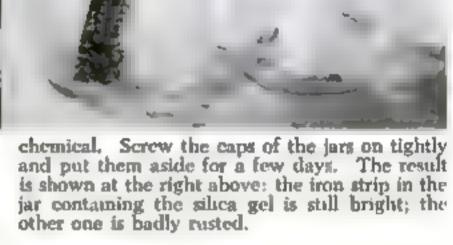
To make you comfortable, the air must be dried enough to permit your perspiration to evaporate sufficiently fast to keep your personal cooling system working. According to experts, that means a relative humidity between 30 and 70 percent. Mold, mildew and other fungi thrive best in humidities above 75 percent. Corrosion is likely to attack iron and steel if the humidity rises



How mechanical dehumidifiers work can be shown by blowing air past a can of ice cubes. As the air hits the can it is cooled past its dew point, the water vapor in it condenses and is left on the sides of the can.



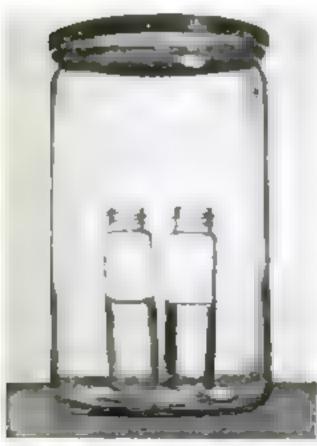
Silica gel's effectiveness in fighting rust is shown by simply test above. Hang a porous cloth bag of the chemical in a jur in which you've put a polished strip of iron and a few drops of water. For comparison, set up a similar jar without the



much above 30 percent. For smaller rooms, closets, or drawers, chemical dehumidifiers are often used. One kind absorbs water until it dissolves. Then you throw it away. It's cheap and can be used wherever the drippings won't do any harm. A more expensive type, such as silica gel, does not dissolve but merely causes water to condense on its porous surfaces. Because there's no drip, this type is best suited for tool cabinets and other small enclosures. It can be re-used after baking in a 350° oven. If silica gel crystals are soaked in a chemical such as cobalt chloride, they will turn from blue to tattletale red when they've taken all the water they can hold and should be dried out.

Blonds preferred. One easy way to measure relative humidity is with a human

hair-preferably a blond one. It expands in a humid atmosphere, contracts in a dry one, moving a pointer attached to one end. Another simple device is a wet-and-dry bulb hygrometer. It measures how quickly water evaporates, which in turn directly reflects the amount of moisture in the air—the quicker the evaporation, the drier the air. This speed is found by wetting a thermometer bulb and moving air past it. The faster the water on the bulb evaporates, the more energy in the form of heat it will take out of the air, and the lower the temperature of the wet-bulb thermometer will drop. By comparing the wet-bulb temperature with that of an ordinary thermometer nearby, the speed of evaporation—and the relative humidity—can be figured. END



Water-grabbing chemicale are used in such products as candy and tobacco to keep them from drying out To see how a typical chemical of this sort works, stand a small open vial half-full of glycerine and another half-full of water in a large jar, which is then closed airtight. As shown in photo at right. the water level goes down from day to day, but the glycerine level rises. This is because glycerine has a lower vapor pressure than water, so it absorbs the moisture that evaporates.



222 POPULAR SCIENCE





This old bicycle, buoyed up by three fuel tanks from an auto graveyard, lets its rider skim a lake like a giant water bug. Sheetmetal paddles welded crosswise to the wheel rim provide propulsion. A framework

of %" angle iron supports the bike between the floats. David Myers of Decatur, Ind., who built the water trike, welded the frame but was careful to keep the torch away from the tanks because of danger of an explosion from lingering fumes. The tanks were made airtight by soldering the seams and openings shut. The trike easily carries a 200-pound adult.

## Back-Yard Grills Come from the Scrap Heap

Major parts of these two back-yard barbecue grills were gleaned from junk. One is portable enough to toss in a car's luggage compartment for picnics and beach parties. The other will have to remain in the back yard, but it can be wheeled from place to place there.

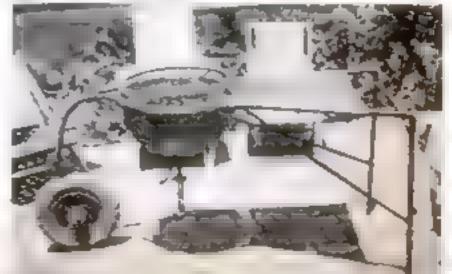
The first barbecue has a bowl that comes ready-made. It is a discarded disk from a plow. To this was welded three angle-iron legs and a rim of %" steel plate. (An old-fashioned tire rim would serve as the bowl rim.) A square of welded steel mesh laid over the hole in the disk forms the grate. The grill consists of similar material.

An old iron kettle forms the firebox of the rolling burbecue. The chef can regulate his cooking by cranking a jack to vary the distance of the grill from the fire.

The kettle is bolted to a frame made of %" pipe, a piece of sheet metal welded across the frame serves as a table, and a trailer wheel rolls the unit around. The grill presses snugly on a shaft welded to the end of the jackscrew, which passes up through a hole drilled in the bottom of the kettle. The fire is built on several pieces of iron rod and a disk of expanded metal lath that rest about 3" below the top edge of the kettle.



Old-time iron kettle was resurrected to serve as the lire pot for this barbecue.



## **Cabinet Dries Clothes**



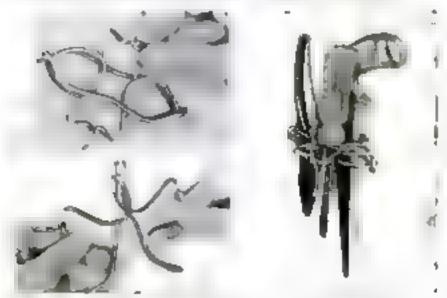
I BUILT this simple plywood cabinet so that we would have an inconspicuous drying place for nylons, woolens and other



sensitive fabrics that can't be put into an automatic drier. The cabinet has a sliding rack that holds the clothes and is fitted with a counter top to match other kitchen units. I bored holes

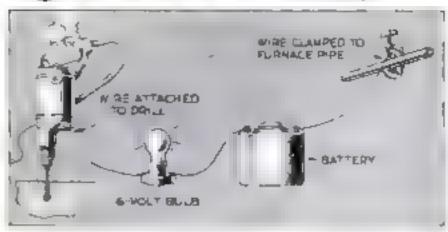
near the bottom to ventilate it and installed a fan to circulate the air.—J. E. Brown, Pittsford, N. Y.

## **Tool Holder from Coat Hooks**



A quick wall holder for shop tools or kitchen utensils can be made by pressing two coat hooks together back-to-back. The spring action holds the hooks together, and they interlock to provide five openings. Serew one side into the wall and clip off the outer screw.—J. J. Rea, Urbana, Ill.

## **Light Warns of Drill Damage**



When you're drilling in a radiant-heated concrete slab, this warning light setup will let you know if you strike a pipe in time to avoid damaging it. Connect a six-volt battery and bulb in senes with a furnace pipe and your drill, as shown above. Then if the drill point strikes metal, the circuit will be completed through the house plumbing and the bulb will light.—O. L. Long, Manhattan Beach, Calif

## Film Drier Takes Small Space



Daying cut films on spring clips takes too much space because they hang side by side. By boring holes in ordinary clothespins and stringing them on a coat hanger, a dozen films can be hung in a small space. Unwind the hanger, slip them on with tubing for spacers, and refasten the hanger with tape.—A. L. Schoeni, Falls Church, Va.

## Workshop Wisdom

Now shed a brief tear for Joe Gunch, Who worked on a big power punch. By nature too hasty, He bypawed the safety.

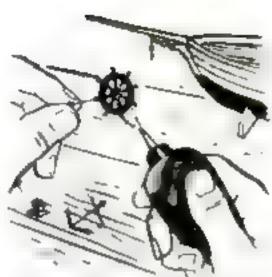
The last heard of Joe was a crunch.



CLEANING WINDSHIELDS



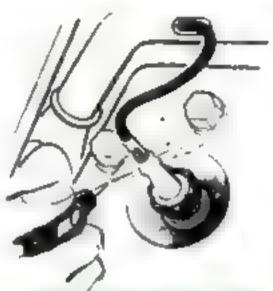
JET-CLEANING SMALL MECHANISMS



AIR-DRYING SMALL PARTS



**BLOWING OUT SANDING DUST** 



DRYING WET SPARK PLUGS



**DUSTING INSECTICIDES** 

## Squeezing Extra Service from Plastic Bottles

Better grab those empty plastic squeeze containers before they're thrown out. They'll come in handy in the workshop and around the car.

EMPTY squeeze bottles have a lot of utility left in them. They make handy little bellows for puffing dust, filings or abrasive grains out of inaccessible places and delicate mechanisms. The air from them is drier than breath and less likely to cause rusting.

Made of polyethylene, these bottles come in both dispenser and sprayer types. The latter has a tube reaching to the bottom and will spray upward. The dispenser bottles have simply a small hole at the top and must

be inverted to squeeze out the contents. Cutting off the tube converts the spray type into a dispenser.

Under the cap of these bottles is a small plug that fits like a cork and can be pried out with a knife for refilling. If the jet or spray is coarser than desired, you can make the orifice smaller by touching the plastic around it with a wire heated in a match flame. Petroleum, turpentine and lubricating oil won't hurt polyethylene at temperatures below 158°. F.

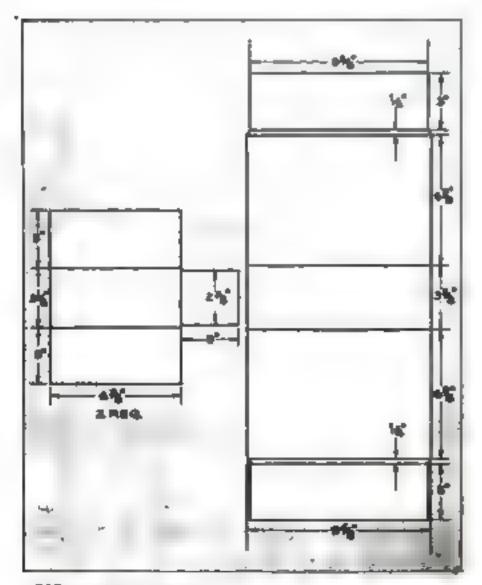


## PSM File Ceps Copies at Your Fingertips

Your back issues won't get lost, strayed or dog-eared if you keep them in these easy-to-make corrugated-board cartons.

YOU can quickly look up plans, articles and other information in Popular Science Monthly if you keep your back copies in a file like this. Made of ordinary corrugated cardboard, each box holds six issues and has a place on the side for listing stories you may want to find later. They're sturdy, handsome and you can mass-produce a bunch of them in an evening. The boxes were designed by noted cardboard engineer Richard E. Paige (PSM, Mar. '52, p. 165), who shows you in pictures how to put one together.

Next month, PSM will publish a full year's index that you can file right along with your issues for quick reference.



225 POPULAR SCIENCE



LAY OUT PATTERN of file on cardboard panel cut from large box. Use soft peneil to avoid gouging face. Fold-lines should run across corrugations for greatest strength.



4 SMALL TABS that form top and bottom of file are cut out and glind on next. Use a quick-deving household cement and press pieces bruly together for several minutes.



7 SEND TOP AND BOTTOM PIECES UP, then fold glued side flap over these. Use blocks and C-clamp to hold flap while glue sets. Spread glue on other flap and repeat process.



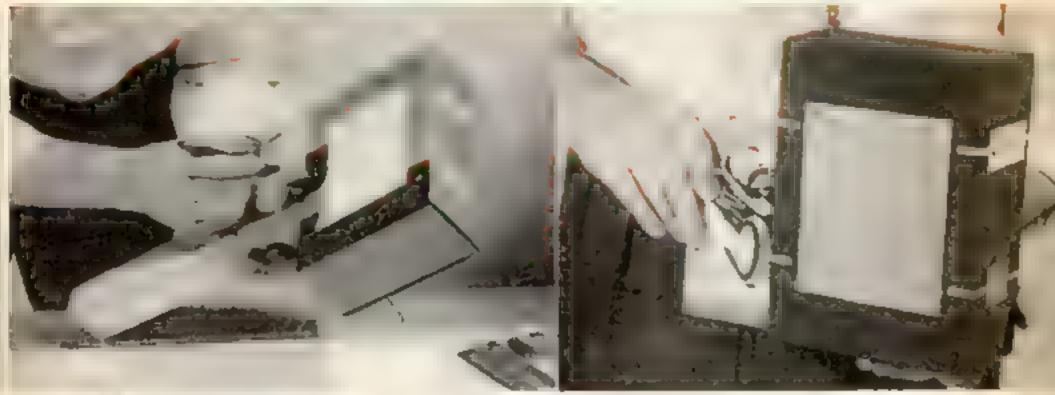
2 SCORE FOLD-MNES by running knife handle or other smooth, blunt tool back and forth along straightedge. This dents cardboard, makes it easy to hend in a straight line.

3 ment caroboard along score lines by holdon the one next to it. Then use knife handle to smooth edges where flaps bend inward.



5 PLACES FOR LABELS are masked before painting by taping on pieces of paper that are later econosed. Narrow bands around hox are made with <sup>1</sup>4" strips of masking tape.

O flap. Cover only one flap at a time and keep glue 1 in from edges so it won't squeeze out of scain when box is assembled.



RUBBER-BASE PAINT is a quick, dorable finish. Short two-by-three wedged into file is convenient handle so you can point all sides easily. When dry, strip off tape.

o FINISHED FILE has index on side for listing articles you want to refer to. Large label on other side is cut from PSM cover. Small labels can be hand-lettered.

## What You Should Know About Magnetos

When your power mower or outboard quits, here's how you can quickly find the cause.

## By J. W. Rocke

If YOU own a power mower, outboard motor, garden tractor or some other gasoline engine, the chances are it has a magneto. This is the little juice-maker that kicks the spark plug. Unlike a battery ignition system, a magneto generates its own current by the relative motion between a set of magnets and a coil of wire and steps up the juice to high voltage. You just give it a push and it's on its own.

Magnetos are a tough, tireless breed that run for years and wear like the iron they're made of. But when they do kick up, there's no need to dry-dock your boat or go back to mowing the lawn by hand. Most troubles are a matter of adjustments that you can make yourself. Those you can't can be handled by any garage with standard autoignition test equipment. A defective part is a couple of bucks and a half-hour replacement job to put you back in business.

There are many types of magnetos, but the parts are always the same. The coil can remain stationary and the magnets move, or the magnets remain stationary and the coil move. Or both may remain stationary with the relative motion provided by a soft fron armature moving between them.

The photos show a typical small-engine magneto where the magnets, set into the rim of a flywheel, are spun around a fixed coil by the crankshaft.

Breaker points are critical. These are electrical contacts that are opened by a cam on the crankshaft every time the flywheel rotates, creating the electrical snap that fires the spark. If the points open too early or too late, the current in the coil will be below peak strength and give a weak spark. This is more important in a magneto than in a battery ignition system because of the comparatively low primary voltage you have to work with. If you don't grab it while it's hot, you lose it.

You can't do much about basic timing, which is determined by the position of the cam on the shaft and generally isn't adjustable. But the spacing of the points also affects timing and should be carefully set to the specified clearance.



FLYWHEEL MUST BE REMOVED to reach magneto parts. Wedge flywheel against block to prevent turning and loosen retaining nut on shaft. Some nuts may have left-hand thread.

TAPPING CRANKSHAFT this way may free the taper-mounted flywheel, though a gear puller is surer. Never drive wedges between flywheel and mounting plate as plate may crack.

Excessive spacing, or a weak spring that doesn't close the points in time for the next spark, can also cause intermittent mishring at high speeds. This is especially important on high-performance jobs like outboards and can mean the difference between leading the pack or eating their spray.

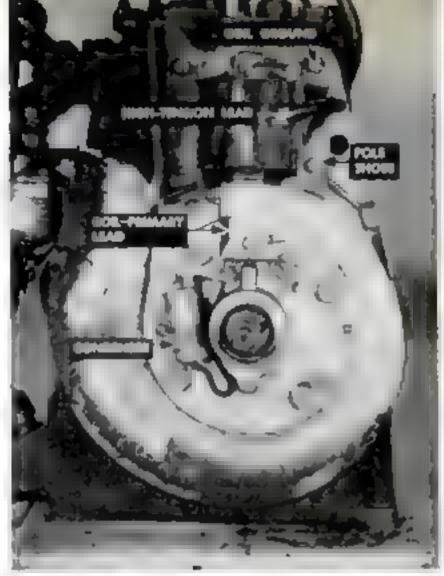
Another sure way to miss the Sunday motorboat outing is with points that have become gummed with oil and grease or pitted and carbonized from arcing. Both cause poor contact of the points, preventing proper build-up of current in the coil. Result: weak spark, no start, and you're left waiting at

the dock.

Clean the points as shown in the photos. Slight pitting can be smoothed down with fine sandpaper, but don't fuss around with points that are badly scarred. These are hard to hone by hand without upsetting their alignment and spoiling good contact. If they're bad, buy a new set,

Use the right condenser. The condenser does two things for you. Connected in parallel with the breaker points, it absorbs the electrical surge created when the points open, preventing arcing that would burn and pit them. It also reverses the current flow, sending the charge back to the coil with the smack that gives the spark muscle.

Any leakage in the condenser or loose connections causing high resistance to the current will rob the spark, and you won't get enough juice to light up a firefly. You can tighten the connection with a screwdriver, but the condenser itself requires special test equipment. If everything else checks

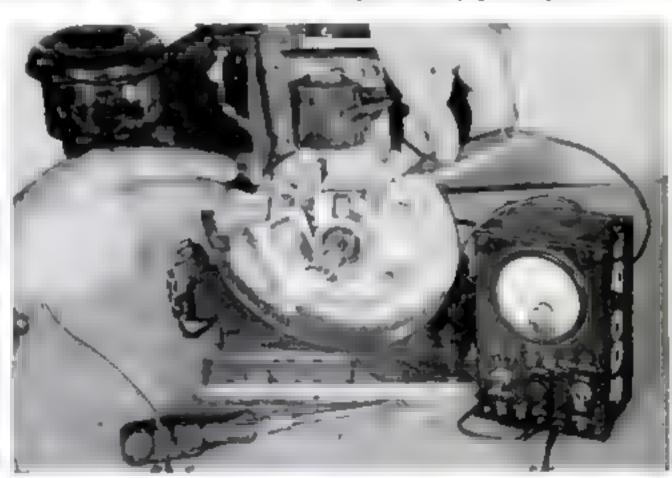


BREAKER POINTS are actuated by cam on crunkshuft that pushes out plunger and opens points each time shaft rotates. Coil on this engine is mounted above flywheel.



SUGNITY WORN POINTS can be smoothed by drawing fine sandpaper between faces. Avoid filing, which roughens faces, causing poor contact. Replace badly pitted points.

BURNED-OUT coil primary can be detected with ohmmeter, as here, or bulb and battery. Block breaker points open with cardboard and connect test leads across point terminuls. Insulate condenser case from mounting plate. To check recondary, connect high-range ohmmeter between plug and ground. Low reading indicates a short.



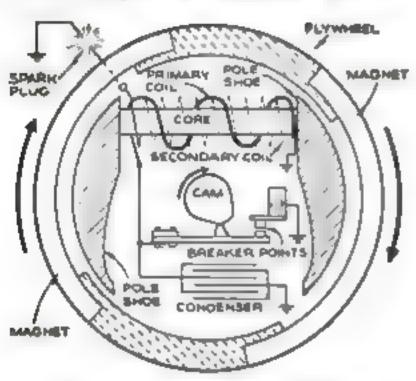
JUNE 1953 229



AIR GAP between coil pole shoes and flywheel should be just enough to prevent rubbing but not more than .012". Check with thickness gauge. Too-wide gap weakens magnetic field.

### GREASE OR CARBON on breaker points prevents good contact, weakens current. Clean points with brush soaked in carbon tetrachloride, then draw hard paper between faces.

## How a Flywheel Magneto Works



As MAGNETS rotate around coil pole shoes, low-voltage current is generated in coil primary, consisting of few turns of coarse wire. Magnetic field is strongest when magnets are directly opposite pole shoes, but due to lag, current does not reach peak strength until magnets have passed shoes. At point of peak strength, cam on crankshaft opens breaker points, as shown above, creating current surge as primary circuit starts to break down. Current can no longer flow through breaker points and is now forced into condenser, connected in parallel with points. Condenser absorbs surge, then discharges back into coil, causing complete and final collapse of primary circuit. This induces high-voltage current in coil's secondary winding, made up of many turns of very fine wire. As current reaches peak strength -20,000 to 25,000 volts-it jumps gap in spark plug, creating spark that fires fuel charge. By this time, magnets have rotated past coil pole shoes again, building op another charge in primary, and the whole cycle is repeated.

out, it's worth a trip to a repair shop. If it proves at all weak or leaky, chuck it,

Get the right replacement, too. If the Gotrocks are coming to dinner and the lawn needs a haircut badly, you can probably get by with an auto-ignition condenser as an emergency substitute. But get the right one as soon as possible. A condenser of the wrong value can cause a weak spark and burning of the points.

Checking the coil. If Junior comes sputtering in on his motor scooter claiming it worked fine when he started and then suddenly conked out, there's a 50-50 chance that the coil's at fault. The other 50 is a bad condenser, which may show similar symptoms.

Coils sometimes check akay when they're cold, then fail after warming up due to expansion that produces an open circuit. For this reason, coils should be warmed up before testing, or you'll be as fooled as Junior.

You can check the primary of the coil with an ohometer, as shown in the photo, or by connecting a battery and bulb in series with the windings. Failure of the bulb to light or no response on the meter indicates that the coil is burned out and must be replaced.

The secondary, due to its high resistance, can be checked only by a high-range ohmmeter. If you don't have one, throw the engine in the car and take a run down to Joe's garage. He'll check it in a couple of minutes.

Look at the spark plugs. These, while not a part of the magneto itself, are another major source of trouble and should be checked at the same time.

Fouled plugs should be thoroughly cleaned and their points gapped to specifications. Badly worn, burned or pitted plugs



FELT WICK, saturated with oil, is used in some magnetos to lubricate breaker-point cam. This should be kept oiled, but apply only one drop. Excess oil may cause oxidation of points.

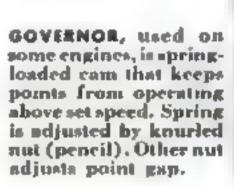
should be replaced. Since you need only one or two, frequent replacement won't break the bank and will help your engine.

Don't abuse the magnets. You can do a lot of worrying about the magnets, but the main thing to guard against is accidental demagnetizing. Handle the flywheel carefully when you remove it from the magneto, and avoid sharp blows with a hammer, excessive heating or passing them near a large current-carrying coil.

Magnets can also lose strength through age. Proper testing requires special equipment, but you can get a rough idea by simply seeing what the magnets will hold. A good healthy set should easily pick up several small wrenches. If they won't, they should be returned to the manufacturer for remagnetizing.

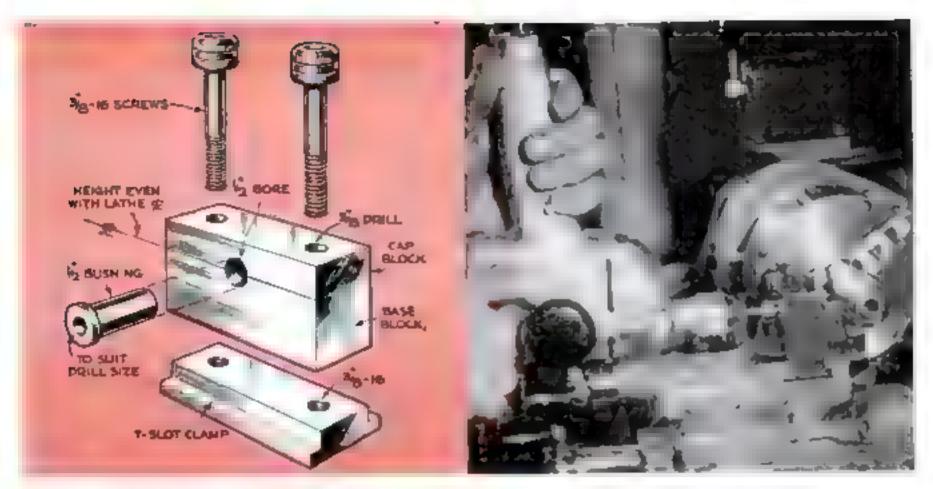


speed is controlled on many outboards by moving handle that advances or retards spark. Heat-resistant grease should be put on breaker-point block that rides cam.





TROUBLE	POSSIBLE CAUSE	de MEDA
Wook spark	Weak magnets Weak cut: Leaking condenser Loose primary connections Cracked spark-plug wire Armature air gap too wide Improper point gap	Hemagnetize Heplace Replace Tighten Replace Adjust
Ne spark	Dirty or burned points Open or shorted cod Shorted condenser Breaker points open, or failing to open Primary warms aborted	Clean or reporce Replace Replace Re, lace Correct cause Correct short
Intermittent misfiring at low speed  Fromt gap too small Weak condenser Improper spark-plug gap		Hegap Check condenser Regap
Intermittent misfiring at high speed	Excessive breaker-point gap Weak breaker-point spring	ltegap Increase tention of replace
Magneto fails ofter engine to warm	Internal short in coil due to espansion internal short in condenses due to expansion	Replace condenses
Excessive burning of points	Weak condenser Condenser of wrong capacity Point gap too small	Replace Replace Regap



## qod2 wan Ideas

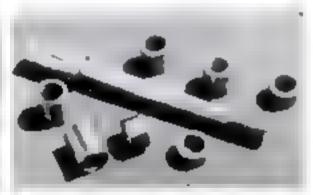
Quide Centers Transverse Holes. With this drill jig you can drill holes accurately across the center of work held in the lathe.

The height and direction of the bushing hole are the only critical matters. Fit the three parts together and lock in the compound. Set the compound parallel with the bed and drill a %" hole with a drill held in the headstock chuck. Bore this hole out to %" with a boring bar held between centers.

In use, the compound is turned at right angles to the lathe bed and advanced close up to the work. The drill is then guided into the center of the work by the bushing, one of which must be made for each drill size.—Joseph Tracy, NYC.







Set of Mandrels Aids Lathe Work. This set of mandrels, ranging from K" to 1" will solve many of your work-holding problems, such as facing both sides of a flywheel. You can also use them to mount slitting saws and milling cutters between centers

MUT COLLAR MANDOSI FILED FLAT POR
LATHE DOG

HH MORK SECTION DIA (MEE) A MA SIG TO TO TO THE
OVERALL LENGTH B STY 4 8 4 7 4 4 5 8 6 8 1 8

WORK SECTION LENGTH C 12 28 3 35 4 4 7 5

SHANK BEGTION LENGTH C 12 28 3 35 4 4 7 5

SHANK NUT COLLAR CLO F 38 132 123 16 16 16 17

THREADS PER INCH C 20 16 16 16 16 13 11 10 0

H-THREAD LENGTH IN NUT - SLIGHTLY LESS THAN 1/2 C. J-COLLAR AND HUT LD. - SLIDING FIT ON A K-LENGTH OF COLLAR - YARIABLE FOR PLACING WORK for many milling operations in the lathe.

Construction of all the mandrels is the

same; only the proportions vary according to the size as shown in the chart at lower left.

Work is held between the collars, which are forced up tight by the end nut. Collars should be a sliding fit over the untapered working area of the mandrel, and are of varying lengths. The mandrel diameters are the only critical dimensions, and should be held to a -.002"tolerance.

Mandrels are turned between centers, and the ends centerdrilled oversize to provide generous bearing surfaces. Flats for the lathe dog are filed on the shank ends of the mandrels. Two wrench flats for tightening are filed on the nuts.—Will Thomas, Buffalo, N. Y.



Key Snaps Back. You needn't hunt for the chuck key if it is attached by a rubber strap, nor ean you leave it in the chuck. for the rubber snaps it out. Anchor a %"-wide strip of inner tube to the drill-press head near the column, cutting it so short it must be stretched to reach the chuck. Loop the other end loosely around the key, making the joint with rubber cement.

DIAMETER

Woodruff Keys
Drive Bushings.
When rebushing a
spindle bore, you can
waste time tapping
the worn bushing out
with a thin rod from
the opposite end.

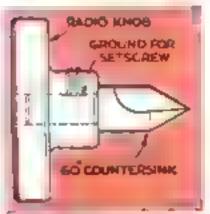
A pair of half-round Woodruff keys, dropped into the bore and shifted to cover the bushing, will permit you to drive it out with a few blows on a rod of about the same diameter as the

bushing opening.—Frank M. Butrick Jr., Alma, Mich.

Clay Holds Measuring Wires. When measuring thread diameters with the three-wire method, press the wires into a ball of modeling clay to hold them in position. The clay is soft enough to allow the micrometer to align the wires as it closes on them.

—R. Walker, Bel Air, Md.

Handy Tool Deburts Holes. A 60° countersink, set in an old radio knob, will



much drill changing when you must remove the burrs from drilled holes. Grind a flat on the shank of the countersink for the setserew -Roger Isetts, Kenosha, Wis.



Make Tubing Telescope. Tubing just a bit too small to telescope with the next size can be expanded as much as .010" by pushing a plug through as above. Turn a slight taper on the plug and turn a recessed anvil (in foreground) to place against the work while the plug is pushed clear through.

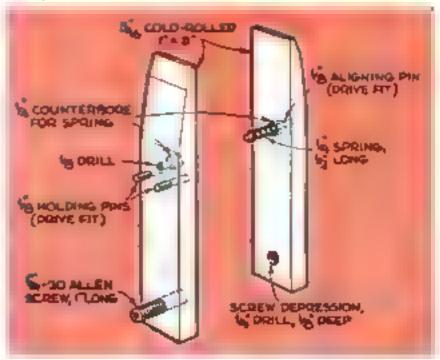
Vise Jaws for Small Work. Use these auxiliary jaws in your bench vise to grip small parts while you perform hand operations on them. You'll find the parts easier to see and less likely to be crushed.

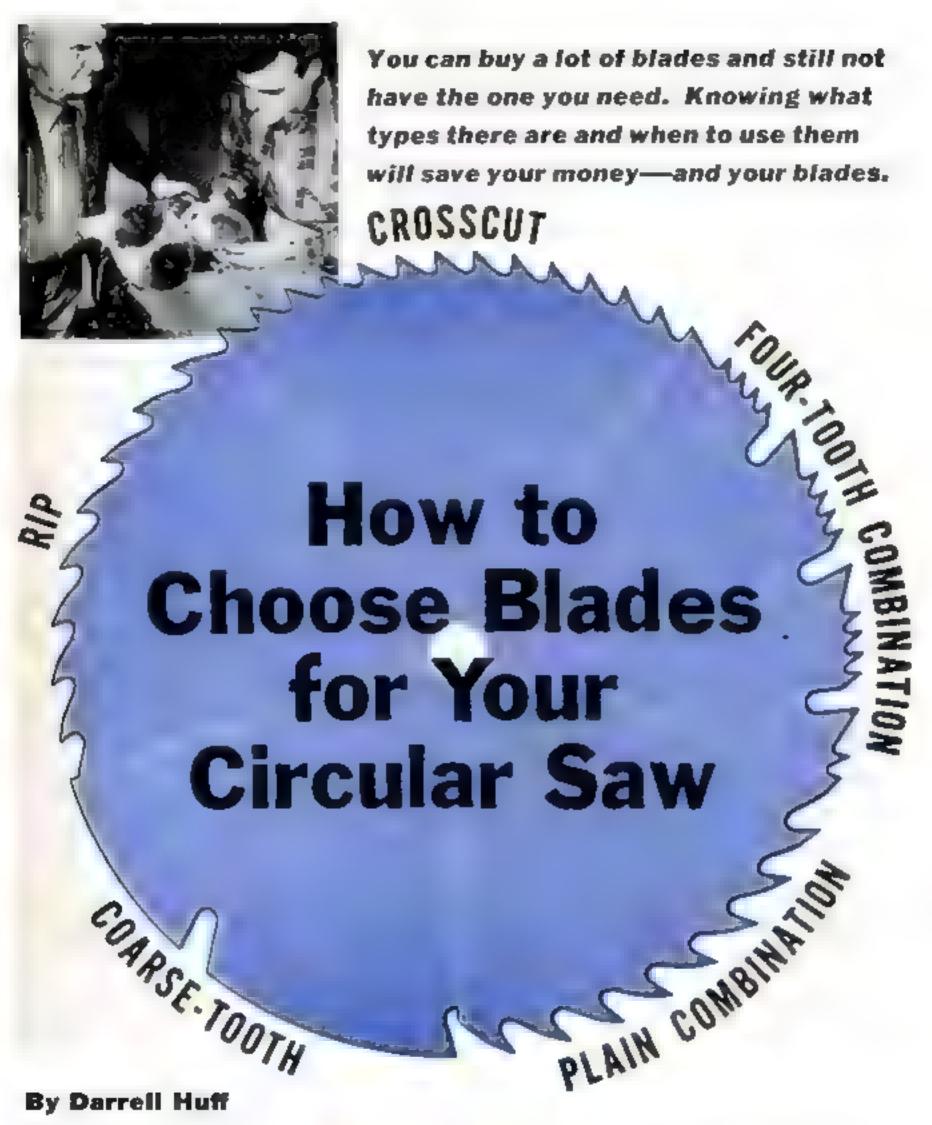
Two scraps of flat stock and some %"

drill rod from your scrap box are all you need to make the jaws. To use, drop the jaws between the vise jaws—the holding pins will support them—and adjust the Allen screw to separate the bottom slightly more than the thickness of



the piece to be held. Place the work between the jaws and tighten the vise enough to secure it. The spring, which is housed in the two "counterbores when compressed, opens the jaws when the vise pressure is released.—Henry Seccik, Los Angeles, Calif.





## By Darrell Huff

"TOGGONE, stalled again'" grumbled my neighbor, Mike Oaks. "Haven't had this table saw six months and now the blade binds and the motor jams."

"Turn it off and let's have a look," suggested Joe Nix, another neighbor of mine. He cleaned his bifocals and put them on.

I kept quiet. When Joe Nix talks, I listen. He used to be a saw maker, and he knows power tools about as well as anyone you'd hope to meet.

Joe squinted at the blade. "Dull," said. "Get it sharpened and it'll cut."

"But that's a hollow-ground blade," exclaimed Mike. "I figured with what I paid for it, it should last . . ."

Joe held up his hand, "What you paid for was the hollow grind-the business of grinding the blade down so it is thicker at the teeth and center than in between, That way, the blade runs freely in the cut without the teeth needing any set."

234 POPULAR SCIENCE

"Set is where the teeth are alternately

bent left and right?" asked Mike.

Joe nodded. "The set in a flat ground blade produces a wide kerf so the blade won't bind. But it gives a rougher cut. Now a hollow-ground blade gives you a very smooth cut and saves a lot of work, but it costs about three times as much."

"How many kinds of blades are there?" "About a dozen that are useful in the

home workshop."

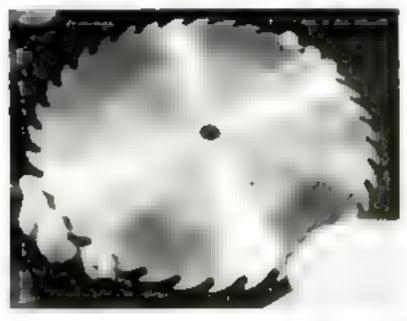
"Yike," yelped Mike, "that's expensive." Joe grinned, "Maybe I'm prejudiced because I used to be in the business, but I can't see that it costs any more to stock the blades you need than to try to sneak by with one or two and then spend your money having them resharpened all the time.

"Look," Joe added, "I'll slip over to the house and fetch some of my blades to give

you an idea what I mean."

It was quite a collection that he brought back

"There are, of course, three types of blades for your circular saw," Joe began. "Rip, crosscut, and combination. This one's a standard ripsaw, flat-ground.



"When you cut with the grain of the wood, you need teeth like these. They act like tiny chisels to rout out the wood. The gullets—these curved places between the teeth-scoop out the sawdust. Here, try it."

Mike took the blade Joe handed him and

started to put it on the saw.

"Say," frowned Joe, "is that how you always put on a blade—just any old way?" Mike looked puzzled, "Sure, why?"

"A blade should be mounted with the trademark at the top and lined up with the scribe mark on the arbor. Then you're sure it's always on the same way."

"But the blade's round Wi t difference

does it make how it's put on?"

Joe chuckled. "That's just it-the blade's

not round. You see, the hole must be a little larger than the arbor so you can get the blade on. That means the radius of the top is slightly shorter than that of the bottom half that hangs down. When the blade's sharpened, the bottom teeth are ground down shorter than the top ones so both radiuses will be the same. But if you got the blade on wrong with the short teeth at the top, it would be out-of-round. That's why you always want to put it on the same way-the way it was ground."

## Crosscut Teeth Shear Wood

Mike carefully lined up the blade, turned on the motor and ran his half-ripped two-byfour the rest of the way through. It went fast and cleanly.

"Well, that's better," smiled Mike, Then he looked entically at the piece of fir, "But

it's not such a smooth cut."

"No," agreed Joe. "You use a rip blade for rough work and when you want to do a

lot of ripping quickly."

Joe spread out three more blades, "Now let's take a look at the blades used for crosscutting, generally called cutoff blades. These must shear the grain of the wood, so the teeth have an alternate face hevel, providing sharp knife edges to the left and right. This one's a regular flat-ground cutoff."

"That's the one to use if I have a lot of crosscutting to do?" put in Mike.

"Right-unless you need very smooth cuts. Then you'd like this smooth trimmer.

It's a hollow-ground cutoff saw. The teeth have a 45° bevel so

they act like knives and actually plane the ends of the lumber,"

Mike pointed to the third cutoff saw. "This one has teeth so this they look like milling on a dime. What's it good for?"

"That's called a miter blade. You'd use it for extremely smooth cutting off and mitering on light stock. It's especially good for anyone doing fine work-models, small boxes and suchlike."

"Say, what about blades for a portable saw?" asked Mike. "My wife is after me to build a sun porch, and I'm going to get a portable if I do that job."

"it'll use the same types as the table

or radial-arm saw," Joe told him. "Except that the blades will have special center holes to fit your particular brand of saw. There are also a couple of kinds made just for portables. One is a fine-tooth cutoff for quick sawing of soft wallboards and insulation boards. Another is a flooring cutoff, sometimes called a nail saw. It's good for old flooring, secondhand lumber, anything where you might hit a nail."

Joe brought out some more blades. "The rest of these are combinations. Any of them will do ripping, crosscutting or mitering. You use them to avoid changing blades

every other minute."

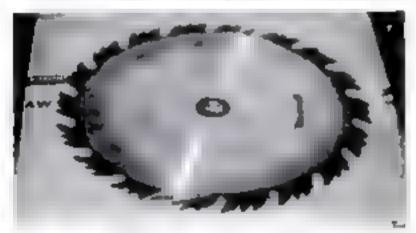
Mike and I examined the first one. I could hardly tell it from the rip blade until I saw that the teeth had a little less hook and were heveled.

Joe was smiling. "This is the plain-tooth, flat-ground combination, a good all-around blade for moderately rough cutting. It cuts fast and is easy to sharpen because all the teeth are alike."

Mike was eyeing an odd-looking blade with an unusual arrangement of teeth.

"What's this one?"

"That's another flat-ground combination.



Each section has two cutting teeth and a raker, so it's often called a novelty saw. It cuts smoother than the ordinary combination, but takes a little more power."

Make picked up the next blade. "Let me try to guess this one. It's the same as the last, but has four teeth to each raker. It probably cuts smoother still."

"Good guessing." Then a twinkle came into Jue's eyes. "Since you did so well on the last one, how about this blade?"

Mike studied it closely. "It has four teeth to each raker like the last one, but this one's hollow-ground."

Suddenly Mike looked at Joe and grinned sheepishly. "In other words," he concluded, "it's a planer blade just like the one I was using when you came in!"

"Right. It gives smooth cuts in any direction-rip, crosscut or miter. It saves a lot of planing and sanding, too, but you do

have to keep it sharp.

"That reminds me of another thing," Joe added, as he started to raise Mike's saw. "Any hollow-ground blade will cut better and last longer if you give it plenty of depth like this. The blade should project through



the work as far as possible so that the teeth run free. Prevents burning."

Mike looked around for more blades.

"Is that the last of them?"

"It would have been up until a few years ago. But there's one important development since then. This course-tooth number first showed up as an import and is now being widely used. It is sometimes called an easy-cut or cut control or safety blade."

Make looked surprised. "Why, it has only -let's see-eight teeth. It actually cuts

wood?"

"Try it and see."

Make ripped a scrap of tough two-by-four easily. Then he tried it for cutoff and a miter. It did the last two easily, too, but gave a rather rough cut.

"Nice thing about this type of blade is that it takes less power than types with more teeth. Since most home-shop saws are powered by fairly light-duty %- or %-horse motors, that's a real advantage when you're cutting tough or thick stock."

## Carbide Teeth Last Longest

"You called it a safety blade," Mike pointed out. "That mean you can't hurt yourself with it?"

"I'm afraid that's asking too much, but it does have less kickback than ordinary blades, and it's supposed to push your hand

away instead of pull it in."

Joe reached into his box of blades. "Here's a fancy version of the same blade—the teeth have carbide tips. It makes a wider kerf, so it calls for a little more pow-



er, but it'll do just as good a job on ripping and a lot smoother one on crosscutting. And the tips stay sharp almost forever."

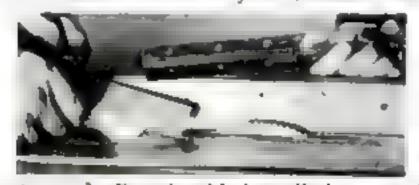
"There's one other problem I have," said Mike. "Can I get a blade that'll saw metals

and plastics2"

Joe checked through his blade box, "There's one blade—yes, here it is—that does most of those jobs very well, It's called a nonferrous-metal-cutting blade."

"Not for iron or steel, eh?"

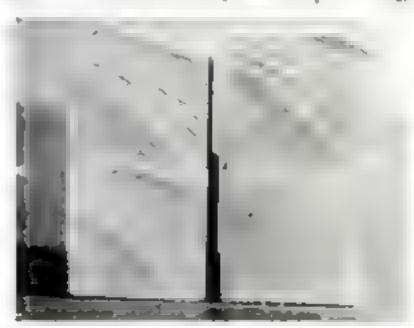
"No, for those you'd better use a flexible abrasive wheel if your backsaw arm



gets tired. But this blade will do a good job on aluminum, brass, bronze and magnesium as well as most plastics. You can get it either flat- or hollow-ground." "So all I need around here is a dozen blades," sighed Mike.

"So all you need is what your work calls for," countered Joe. "You've got a good start with that planer blade for furniture and other demanding work. Get a combination, either the regular or eight-tooth kind, for rougher work so you won't dull the hollow-ground. Then you can add other blades as you need them."

As he talked, Joe piled up a stack of four scraps on the bench. "You can get an idea from these exactly what kind of cut each blade makes. The top one here on the left is the coarsest cut, made by the regu-



lar cutoff saw. One on the right is the flat-ground combination. Still smoother is the eight-tooth carbide blade on the bottom there at the left. And guess what made the one on the right, the smoothest cut of all? That's your planer blade you were having so much trouble with." END

## CIRCULAR-SAW BLADES

Use first choice if you have it, second or third if you don't-or to save changing blades.

The Job	First Choice	Second Choice	Third Choice
Heavy crosscutting, such as study and timbers for building	5-tooth, carbide-tipped	cutoff	flat-ground combination
Heavy ripping	8-tooth	rip	combination
Light ripping	8-tooth, carbide-tipped	8-tooth or rip	combination or planer
General woodworking and furniture	planer	flat-ground combination	8-tooth, carbide-tipped
Fine cutoff and mitering thin stock	smooth trimmer or miter blade	planer	combination
Plywood and hardboard	8-tooth, carbide-tipped	combination	planer (will dull fast)
Plastics, soft metals	nonferrous- metal-cutting		

FOR YOUR POPULAR SCIENCE MONTHLY INFORMATION FILE



Connecticut's own Africon Queen has paddle wheels instead of a prop and would delight any steam fan. Its builder fires it on scrap lumber, apple crates, and broken chairs. The hull is an old 18' fishing boat of 5' beam, with ballast added to counteract effect of tall botler, At 180 r p.m., engine turns the paddle wheels 40 times a minute and the little side-wheeler does a few modest knots, Reverse, rudder and throttle give excellent control and maneuverability.

## Steam-Car Engine Runs Side-Wheeler

Ever wished you had a steamboat? Look what one fan did with an old hull, a Locomobile engine, a homemade boiler and a couple of wagon wheels.

GAS engines are fine if you just want to get some place, says Richard T. Finn, of Litchfield, Conn. But for years he dreamed of a real steamboat, with an engine he could see go round, and oil up and tinker with. It took a long series of finds and swaps to turn up the necessary parts.

Now he has an African Queen on which, with a few armfuls of wood, you can sail all day to the pleasant chuffing of a steam engine and the soft slap of paddle wheels

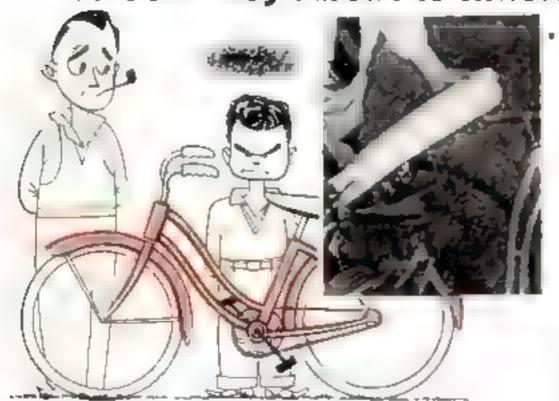
The two-cylinder engine, of 25" bore by 4" stroke, is from a Locomobile steam car.

Having no dead center (the cranks are 90° apart) it can be started, stopped, or reversed from any position, like a locomotive, by a lever that controls the valve motion. A throttle controls speed.

The engine shaft had an old-fashioned block-chain sprocket that could not be removed without dismantling the engine. Finn eventually found some block chain, and a large matching sprocket. With this on the wheel shaft, he had a 1 to 4% reduction.

Paddle wheels were made by bolting 8" by 9" pieces of manne plywood to every

## Is Your Boy About to Inherit Big Sister's Bike?

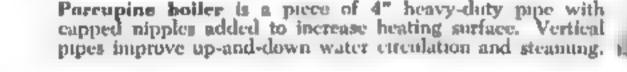


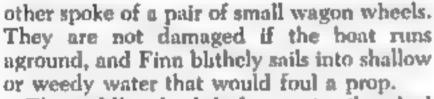
When my oldest girl was presented with a new 28" hike, her younger brother was in line to take over her 26" wheel. But it wasn't long before his playmates made him realize that boys don't ride girls' bikes—and we had a problem.

The bicycle repair shop offered to solve it by welding an extra bar into the frame, and wanted all but a corner of a \$10 bill for the job. Instead, a homemade dummy tank did the trick at practically no cost. It added a slick custom-built touch



Engine is reversible by valve link motion controlled by lever at far left. Lubrication is provided by engine-driven pump that forces od into steam line. Throttle wheel (behind pipe) is old sewing-machine flywheel.





The paddle-wheel shaft turns in oil-soaked oak bearings bolted to the gunwales. A center bearing keeps it from bending under the pull of the drive chain.

Finn's boiler was made by screwing a lot of capped pipe nipples into a length of 4" pipe. Its outer casing was once a household boiler. It has ample draft for wood, but Finn added a pipe and valve to shoot the

engine exhaust up the stack, creating enough draft to burn coal if he likes.

Tested to 250 p.s.t. cold-water pressure, the boiler has a safety valve that blows at 40 lb. The boat runs nicely with 30 lb. and will move on as little as 10. Water is pumped into the boiler by hand when the engine is not running, and by a power pump driven from a crosshead when under way.

To scurry from throttle to fire door over the Queen's machinery takes acrobatic enthusiasm. Although Finn has sailed alone, a fireman helper makes it more fun.

## ... Here's a Way Out

It was built as a sandwich, the centerpiece cut to fit snugly between the upper frame members and planed to a thickness equal to that of the frame tubing. The two outer pieces were shaped to blend with the bike's lines and glued to each side of the centerpiece. Two carriage bolts clamped the tank securely in the frame. A coat of paint and six reflectors completed the job.—Herbert Pfister, Glen Cove, L.I.



## I Flew with Our Radar Scouts

[Continued from page 131]

works in reverse. His little black boxes receive radar signals from outside sources and break them down. By electronic analysis of the frequencies he can tell what type of radar they come from (friend or foe).

Activity at the CIC officer's console interrupts us. Commander Rowe tells me

to plug in my earphones.

## "Seven Baysides at Angels Four"

I hear the crisp voice of the CIC officer making contact with the Coral Sea, command ship of the task force, "Hello, Birch Tree. This is Seven Baysides 100 miles northwest of you at Angels four (4,000 feet) proceeding to station. What are my instructions?"

"Hello, Seven Baysides. This is Birch Tree. Your instructions are to take station 60 miles west of us and conduct barrier patrol normal to course of Peter Item Mike (Point of Intended Movement). Your area of responsibility is 210 degrees

to 300 degrees.

That means we will be flying a backand-forth barrier patrol of 70 miles. We drop down a couple of thousand feet and slow to an economical cruising speed. We are going to be on this job about 13 hours.

Radar controllers one, two and three are assigned the task of air search for enemy planes. Each one concentrates on a different section of the scope picture. Controller four is put on weather reconnaissance and station keeping (informing the pilot when we reach the terminals of our patrol run).

### Jet Interceptor Launched

Birch Tree informs us that our CAP (Combat Air Patrol), a jet night interceptor, has been launched and that we should establish radio contact with him. His code name is Anyface One.

"Anyface One, this is Seven Baysides."

What is your position?"

"Seven Baysides, this is Anyface One. Twenty miles west of Birch Tree at Angels 15," "Roger, Anyface One. Vector 270 degrees for identification."

As the arm sweeps around the scope we see a pip turning due west. We have established the identity of Anyface One.

It's a little after three o'clock in the morning. An early breakfast of scrambled eggs, baked beans, coffee and milk is served. Commander Rowe relieves the CIC officer, and as there is no unusual activity on the scope I take the opportunity to learn some more about this complex business of radar patrol.

## Radar Picture Televised to Carrier

Projecting from a movable arm above the radar console is a little triangular black box. It's a tiny TV camera for video insertion on the scopes of the controllers of anything the CIC officer writes or draws on his scope glass. But there's more TV than that. Next to the cargo door is a large unit called a video relay that enables the AEW plane to televise its radarscope picture to the CIC aboard the aircraft carrier. It also can pick up a scope picture from a more distant AEW plane and retransmit it to the carrier.

The voice of Controller Two comes over the radio: "Bogey (unidentified plane) closing 250 degrees at 120 miles.

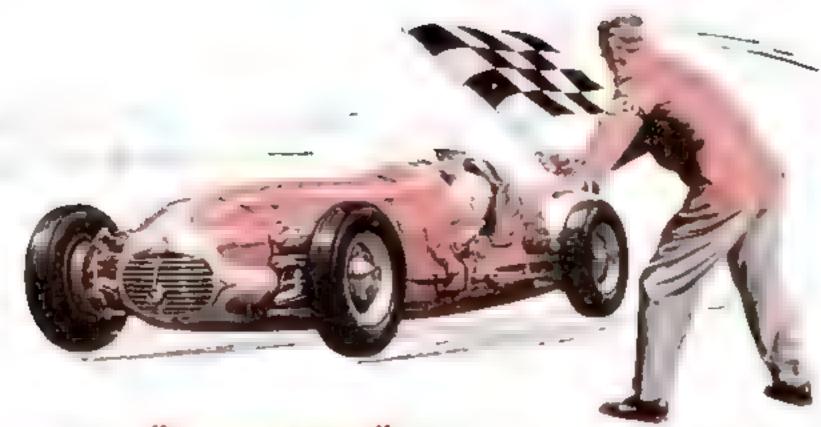
Speed 200."

## Height-Finder Redar Comes into Play

Commander Rowe directs Controller Four to establish altitude of the Bogey. (It's a P2-V Neptune from Jacksonville Naval Air Station.) This brings into play the airborne height-finder radar, used for the first time in this exercise. Controller Two, having established the bearing of the Bogey with his pointer, presses a height-finder button. An operator sitting next to the CIC officer then puts the height-finder radar antenna to search in that area. When its radar waves find the Bogey and bounce back the information, it is electronically translated into altitude. In this case it is 3,500 feet,

Commander Rowe informs Birch Tree,

[Continued on page 242]



## THE REAL "WINNER" AT INDIANAPOLIS

## IS YOUR CAR

great many of the major developments and improvements now used in your car. Advancements in spark plug engineering are a perfect example. Champion-equipped engines have won the vast majority of these races. The knowledge and experience gained in this toughest of all testing grounds is used by our engineers to produce constantly improved, better performing more dependable Champions for your car. So try a set! You will never again be satisfied with ordinary spark plugs.

CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO



Better by Far for EVERY CAR Regardless of Make or Year!

## DRAWFILING...



Drawfiling with a Nicholson or Black Diamond file (which is perfectly straight, accurately cut and of highest quality) produces a truly smooth, level surface, considerably finer in finish than does "straight" filing. Clamp the work in a vise, using sine, copper or other soft metal "protectors" to prevent vise presoure from damaging work. Greep the file firmly at each end and, without "rocking" it, alternately push and pull it sidewise across the work.

A 7HE FILE TO USE: Ordinarily, a Nicholson or Black Diamond Mill Bastard File (illustrated) is best for drawfiling. But where a greater amount of stock is to be removed—as on the edge of a metal sheet or plate—a Flat or Hand file (double-cut) will work faster. The resulting surface is not as smooth, so it may be necessary to follow up with the single-cut (Mill) file. Your hardware dealer has both types.



## NICHOLSON FILE CO.

Previdence 1, R. J.





## 1 Fiew with Our Rader Scouts [Continued from page 240]

which comes back, "Designate your Bogey 31. Intercept with Anyface One." Controller Two now watches his scope and directs Anyface One, the night jet interceptor, to his target, guiding him closer and closer.

"Hello, Anyface. This is Seven Baysides. Bogey now passing starboard to port at one o'clock, four miles, 500 feet above you, Punch."

Punch is the code word for the night interceptor plane to turn on his own intercept radar.

"Hello, Seven Baysides. This is Anyface One. Contact at Angels two, Splash."

The code word "splash" means that the jet fighter has the Bogey in his gun sights and technically has shot him down.

At 4.20 Strike Group Four Able, consisting of 20 propeller-driven fighters with 10 Banshee jet fighters for cover, is launched from our two aircraft carriers. We pick them up on our scopes and guide them through weather and onto their land targets.

## We Splash 10 More Bogeys

Birch Tree launches another Combat Air Patrol for us. We continue routine barrier patrol, intercepting and splashing 10 more Bogevs.

We are relieved by an AEW B-17 at 3:15 a.m. Two hours later I hear our pilot: "Patuxent Tower, this is Seven Baysides, five miles northwest of field at 4,000 feet."

Patuxent advises us that the field is under instrument conditions and that we are to contact GCA (Ground Controlled Approach) for a landing.

We do, GCA acknowledges, instructs us to position for identification and brings us in for a normal radar landing after 17 hours in the air.

### **Hidden Virtue**

MAN may have more courage than woman but he doesn't get half the chance to show his backbone.—Processing Equipment News.

## It's the sportsman's movie camera



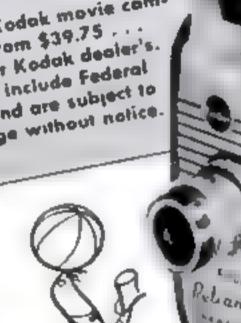
## 30-shot loading

Uses economical 8mm, roll film with easy, no-thread loading, Enough film in each roll to shoot 30-40 average-length movie scenes!



at your Kodak dealer's. Prices include Federal Tax and are subject to change without notice.





## Telephoto for long reach

An accessory lens magnifies 3 times to let you come up class on those hard-to-reach shots. View finder shows fields for standard or telephoto lens.



## Movies rain or shine

Your choice of an 1/2,7 lens . . . plenty fast for cloudy-day shooting . . , or a super-speedy 1/1.9 job that can see in the rain. Both Lumenized (hard-coated), of course,



Tough...rugged

Die-cost oluminum body is built to take it. Your "Reliant" thrives on rough going - yet it's sweet-FURNING as a custom-made reel.



Built-in exposure guide takes out all the figuring, leaves only the fue . . makes sure exposure's right every time!



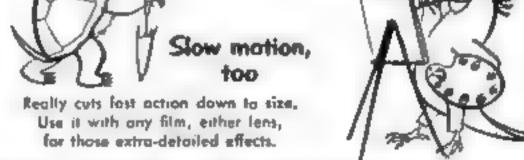
Light and compact enough to slip in a jucket pocket where it's always ready when action starts papping Swings and points as easily as your own 12-gauge.

a pocket



## Color movies, of course

They're easy mexpensive, too. Kodachrome mavie film costs but \$3.95 a roll (8mm)including process-Digi (Only \$3.25 for black-and white.



Eastman Kodak Company, Rochester 4, N. Y.

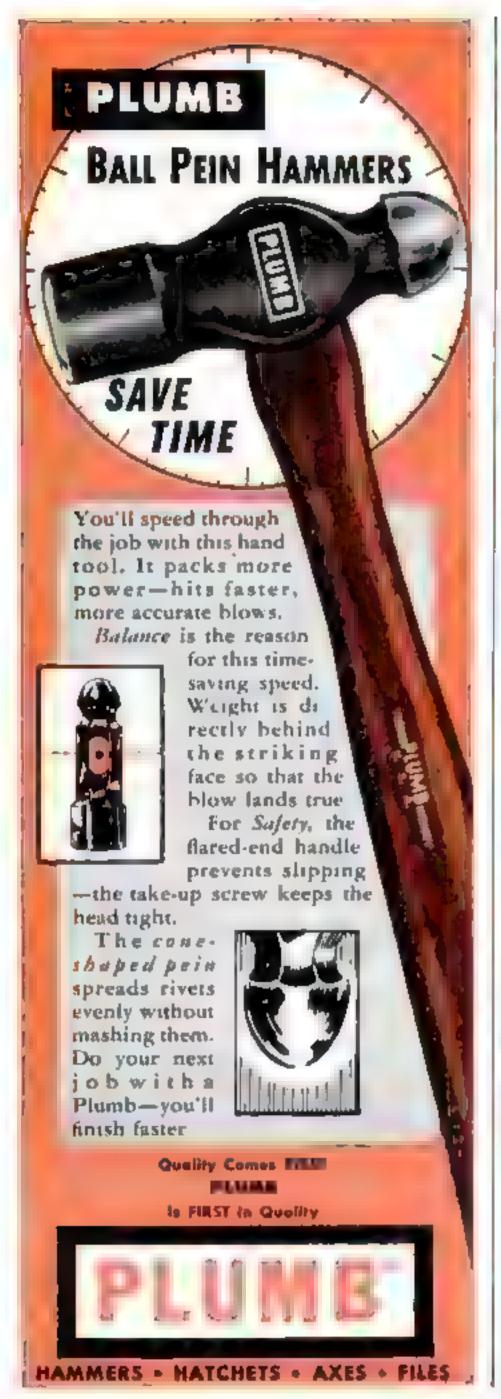
State.



### "LET'S MAKE MOVIES"

A free and fascinating booklet that tells you haw to make color movies . . . haw to make movies indoors as well as out ... how to choose the right camera for your needs. Just fill out coupon and send to Kodak.

Please send free copy of	"Let's Make Movies" to:
Name	
Address	
Çriy	Koda



## Anybody Can Build a House

[Continued from page 119]

a neighbor, a brother and a brother-inlaw.

On April 5, 1952, the Poceks moved into their homemade house, a bit ahead of the average owner-builder, who takes from a year to a year and a quarter.

Pocek was a rarrity in that he had no major problems in the course of erecting his home.

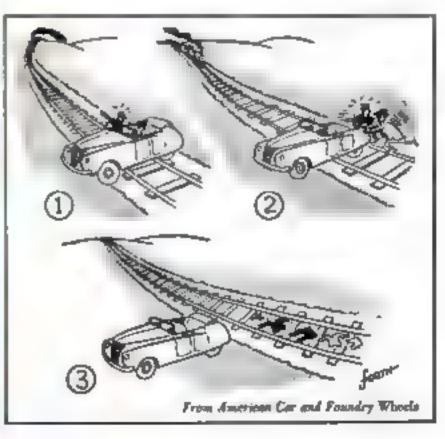
Nearly everyone, Oscar Maeder says, has trouble framing the roof. Trying to figure the length and angle of cut of the timbers causes universal headaches Maeder can usually straighten the troubled builder out by rough drawings and counsel.

Before the Second Federal put an end forever to amateur plastering, one owner-builder assured Maeder that he could do his own.

For two weeks there was no report. Then, with misgivings, Maeder dropped by the man's house, climbed the stairs and looked in at the bathroom door.

"There was a heap of plaster about two feet high in the middle of the floor, and darned little on the walls and ceiling," says Maeder.

"I called my man, and no sooner had I spoken his name than he said loudly, 'All right, Maeder, you win. Go ahead and hire plasterers.' Then he added, a bit sheepishly, 'I was ashamed to tell you what had happened.'"



"13 cross-country trips and she's still <u>singing</u> <u>sweet!"</u>



"Sure, I've had to use replacement parts! But not often—because I've always insisted on GENUINE FORD PARTS!"



They're made right to fit right because they are made exactly to Ford specifications—by the men who designed and built your Ford. So they're easy to install—save repair time.



They're Track Tested and proved in the most punishing tests imaginable by Ford engineers before they win the Genuine Ford Parts label. They're really built to take it.

They're easy to get, too!
They're available at all Ford
Dealers and the selected
independent garages where
you see this sign.

Keep your Ford ALL Ford



## You'll be money ahead when you discover

## THERE IS A DIFFERENCE IN HOUSE PAINTS!

In this age of scientific progress you are entitled to house paint on your home that provides the maximum in lasting beauty and protection. Sherwin-Williams makes SWP House Paint in only one grade . . . the best we know how to make. You benefit four ways when your home is painted with SWP ...

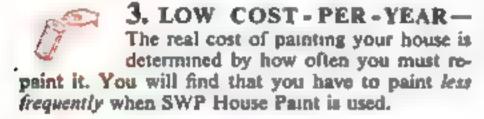


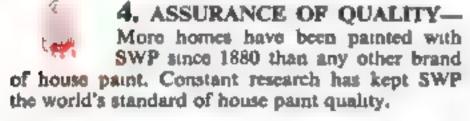
I. LASTING BEAUTY—When you paint with SWP House Paint in 1953, you can expect longer lasting beauty than ever before.



2. MAXIMUM PROTECTION— Building and repair costs today are the highest in history. You want to protect

the investment you have in your home. SWP House Paint will give it greater protection than ever before,





Why risk disappointment when you are sure of satisfaction if SWP House Paint is used? There are substitute house paints that sell for less than SWP, but don't let that fool you! Insist upon SWP, and be sure!

Write for the free booklet, "The Truth About House Paint" . . . The Sherwin-Williams Co.,



Go to the store that displays this famous tradomark

1206 Midland Boilding,

Cleveland 1, Ohio.

SHERWIN-WILLIAMS

EW-2310

246 POPULAR SCIENCE

## Earthquakes Are His Hobby

[Continued from page 137]

When the tower sways with the earth, the short ends of the bars are held relatively motionless by the weighted cases. At the pen ends, the slight relative movements between bearing and anchor points are greatly magnified.

The bars are so linked and pivoted that one is sensitive to north-south movements, another to east-west movements. the center one to up and down motion.

Robinson can usually plot the epicenter of a quake within 10 miles. The very first jiggle tells the direction. Eastwest and north-south traces can be plotted together to pinpoint it.

Earthquake shocks have three distinct phases. The first one is a compression wave directly up to the earth's surface, which moves up and down in that locality. (Official records of the Tehachapi quake in 1952 put this movement as high as three feet.)

A secondary transverse wave goes through the underlying rock, while a third one travels through the surface crust. Since seismic waves move at five to seven miles a second, the time interval between these phases (which look different in a seismogram) establishes the distance to the epicenter.

## House Is Wired for Quakes

To make sure he doesn't miss anything interesting, Robinson has a buzzer and lamp in the kitchen that signals any quake up to a certain minor intensity. More severe ones also set off a gong that rouses the house.

Living as he does in an earthquake belt, Robinson has a normal respect for the earth shocks. But even though he is San Diego's expert on the subject, he'd much rather record them from the mid-Pacific than in his own back yard.

## No Dunce, He

Teacher: "Class, what is a flood?" Bright Boy: "It's a river that's too big for its bridges."—L & N Magazine.



# The plier design that all others



Controlled planty pro-finish at the Typics of most Indicates Supplement and a Total

Here's the new, improved Channellock Plier bringing to you new features which offer more positive gripping, greater strength and longer wear. The undercut interlocking channel is the first ready new idea in plier design in years. Engineering skill has developed a plier with new patented features which give you the newest, strongest, most practical plier you can buy. Here is a plier that will last for years! Channellock Phere made only by Champion DeArment Tool Company, Meadville, Pa.

CHAMPION DOARMENT TOOL CO.

MEADVILLE, PA.



## Gus Puts the Heat on an MG [Continued from page 196]

he lighted the oxyacetylene torch, adjusted it to a medium-hot flame, and pushed the flaming tip into the end of the tailpipe. In a few seconds, dark gray smoke started to stream from the manifold end. Finally, when the tailpipe started to get cherry red, Gus reached down and shut off the acetylene and turned the oxygen full on. The smoke continued to stream from the other end of the pipe.

## Gus Buens Out the Carbon

"If I'm lucky maybe we'll be able to burn the carbon out," explained Gus.

As the three watched, the cherry red section seemed to travel up the tailpipe, along the muffler and finally to the manifold section. In about 20 minutes there was no more smoke. Gus shut off the oxygen.

About a half-hour later, the MG's exhaust was back in place. Gus started the motor and it took the gas well. Evidently Gus's burning-out process had worked. Then came the final proof—a road test. The motor responded beautifully. On a deserted stretch of highway. Gus got the little car up to 85 without any urging.

And on Sunday morning, at breakfast, Gus got his thanks. An item in the local Sunday paper read.

## LOCAL BANKER WINS IN ROAD RACE

J. B. Barnes, president of the Empire Bank & Trust Co., took first place in his division of the sports-car road race held here yesterday. Mr. Barnes, virtually unknown in national sports-car activities, astonished a field of seasoned veterans by skillful maneuvering of his well-tuned MG around the sharp curves and 90-degree turns of the Mill Road course. Hitting a fast pace right from the start, Barnes took an early lead . . . END

Next month: Gus calls a close one.

## Shutter Nut

AT a recent eclipse of the moon a college freshman arrived at the observatory with her camera. She said she was going to take a picture when the moon was entirely eclipsed. Someone remarked that she wouldn't get much of a picture, but she was unperturbed.

"Oh, don't worry. I have a flashlight attach-

ment."-The Wuatt Way.

## Only AMF builds a Power Shop that does everything in woodworking...

with one direct-drive motor!

EASY... to operate and learn Adjusts in seconds to miter, rip, bevel.

SAFE...cuts the PROPER way...
above the work...blade does the
moving, work remains stationary

PRECISE...calibrated scales let you position cutting attachment accurately for any cut.

COMPACT...a complete, big-capacity home workshop, (cuts 2 4 " deep, rips to center of 4-foot panel).

Fits in a 8-square-foot area.



Now on sale in department stores, harowe e stores, mill supply houses.

## @ DE WALT

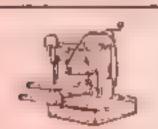
"Fluir Shep"

12 power tools in 1—it does everything!



PROFESSIONAL SHAPER!





BIG-CAPACITY JIG SAWI



POWERFUL DRILLS

## Makes every cut and joint!



MITER CUT1



RIP CUTI



LOCK JOINTI



MORTISE AND TENON JOINT

18 different operations with saw blode alone!



And it's a dado, sender, router, grinder, metal cutteri

products are better...by design

AMERICAN MACHINE & FOUNDRY COMPANY

## SAVE 80% ON FINE FURNITURE!

Send for "Make It Yourself" booklets!
28 pages...20 pieces of furniture.
Exact make-it-yourself savings.
Finishing tips. Complete De Walt\*
"Power Shop" instructions.



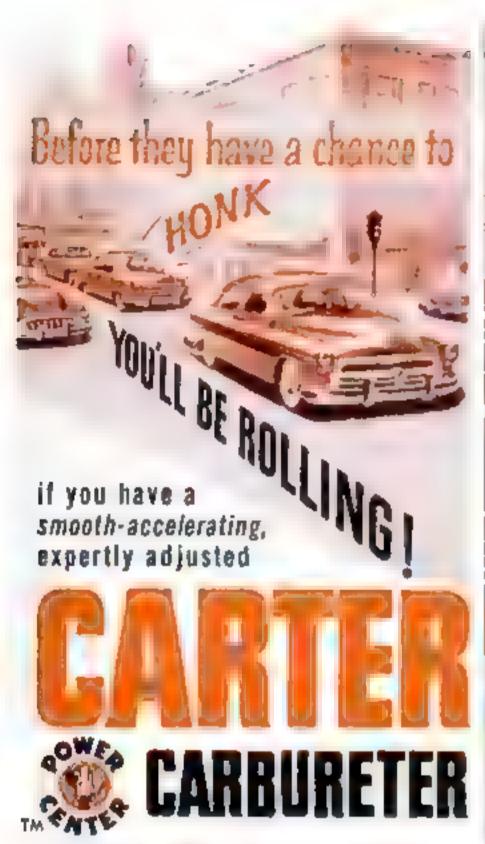
Sood 25c-Seve Hundreds of Dollarst

AMP De Weit, Bept. PS-6, Loncoster, Pa. Floure send "Make It Yourself" beeklet(s) checked below, Enclosed find 25c (se cole) for each ann.

- Early American and Javantie furniture. [25c]
- Medera and Outdoor furniture (25c)

Nome\_\_\_\_

Addren



You'll feel the difference the minute you step on the gas. You'll save the difference in Improved gas mileage. An expertly adjusted Carter Carbureter is important to give you your money's worth in pleasant, economical driving performance.

Go to your nearby CARTER Service Shop for fast, friendly carbureter service or replacement. You'll find the

CARELLER in the yellow pages of your phone book.

YOU'LL GET A LIBERAL TRADE-IN ON YOUR OLD CARBURETER



## "Fill 'er Up with Fuel Oil"

[Continued from page 84]

Lest all this sound like something too good to be true, it's only fair to complete the list of the Diesel's faults. We already know that Diesels are noisy at idle and lack snap. They get more out of their fuel than a gasoline engine, but waste more on their own machinery. Their "friction losses" are greater because the moving components are heavier.

The Mercedes-Benz people may argue that point. They say the actual difference in weight between their Diesel and their gasoline engine of the same displacement is only 33 pounds. The two engines, in fact, use the same blocks and crankshafts. That may be true, but with all the necessary accessories aboard, the Diesel car weighs 120 pounds more than the gasoline car

And the gasoline engine produces a quarter again more horsepower. To get the same horsepower with the Diesel would require a power plant even heavier. Diesels not only are slower, they have to be more rugged too.

The Doctor Is Pleased

Yet, Dr. Schmidt-Bacumler's Diesel chariot is perfectly satisfactory to him and—apparently—to a small but growing number of other buyers here in the United States

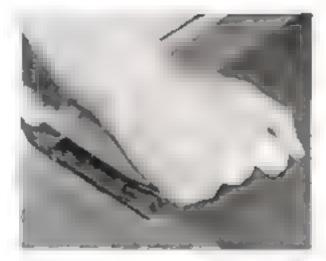
Its size, an omen for the future in this day of rising fuel costs, gives the Diesel a quarter of a ton less dead weight than the lightest of the Ford, Chevrolet or Plymouth sedans. As for the engine, about the only other objection to it is what might happen when the car was driven into a parking lot.

Imagine saying to the attendant: "If you have to move my car, you turn this key here. Then you turn this handle and press this, wait until the light turns red, turn the handle farther—oh well, never mind. If you need me, I'll be in that restaurant across the street,"

The Hard Way

Some people learn traffic rules by accident.— Viking Vacuum.

# FASTEN IT FASTER



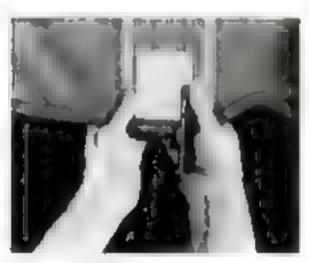
PLASTIC SCREENING can be tacked to frames quickly and easily with Battich B-S used as tacker.



PUT WRAPS on your paint brushes between jobs. Bostitch B-8 has removable base for getting into tight places.



STOP HEAT LOSS by covering warm air ducts with asheaton paper. Bostuck B-8 makes it an easy, one-night project.



TORN CANVAS on awnings or furniture can be mended by stapling parts with Bostitch B-8.



SANDING BLOCKS are easy to make when you tack sandpaper to blocks of scrap lumber with Bostitch B-S.



stapling them to material to be cut. Lift them easily with Bostitch B-8's staple remover.



Bostitch gives you the only fasteners with staple remover attached.

### with the Bostitch B-8

WITH REMOVER

IT'S A STAPLE REMOVERS

The Bostitch B-8 is one of 800 Bostitch staplers and statchers made for home, office and industrial use. For help in solving production line or shapping room fastening problems, write: BOSTITCH, 526 Mechanic St., Westerly, R.L.





 You'd soon realize how much an oil-pumping engine costs, if you bought all that wasted oil at one time.

Every extra quart is a danger signal—and so are loss of power and smoke from the exhaust. They're symptoms of worn-out piston rings. And the sooner you replace those rings, the more money you'll save.

As your engine gets older, the cylinders wear tapered and out-of-round. The engine runs hotter because of accumulations in the cooling system. It needs more oil on the cylinder walls.

The problem is to deliver this needed oil, under full control. This requires a special type of piston rings... replacement rings.

Hastings makes replacement rings exclusively... devotes all its research to the particular replacement problems of each make and type of engine—for rering, re-bore and re-sleeve.

Hastings rings are nationally known for their ability to stop oil-pumping, check cylinder wear, restore engine performance.

So go to your motor specialist at the first sign of oil-pumping. He'll gladly install a Hustings Steel-Vent replacement set. Truly the best money you can spend on your car. Hastings Manufacturing Co., Hastings, Mich.; Hustings Ltd., Toronto (Piston Rings, Spark Plugs, Oil Filters, Casite, Drout)



GENTLE ON CYLINDER WALLS



## HASTINGS

STEEL-VENT PISTON RINGS

Regular or Chrome-Faced

### Can We Tame the H-Bomb?

[Continued from page 99]

Los Alamos Scientific Laboratory, at Cornell University, and elsewhere in this country. Some have been on far from a miniature scale.

At Los Alamos they have been carried on outdoors in tubes up to 50 or 60 feet long, which are blown up at each trial. Shaped charges are reported to have been used in these tests, of which only a few details have been made public.

An eight-foot steel "shock tube" at Cornell packs no mean punch. When gas pressure bursts a diaphragm near one end, a shock wave races through it at up to 17 times the speed of sound. Developed by Dr. Arthur Kantrowitz and associates for guided-missile and aeronautical studies, supported by the Office of Naval Research, this non-secret installation offers a visitor a first-hand view of these waves awesome effect.

### **Heat Evaporated Metal**

When a shock wave struck a brass fitting of 1%-inch diameter in this tube, a quarter-inch length of the solid metal was evaporated by the heat—in about 1/10,000th of a second! Gases in the tube become brilliantly luminous during a shock wave's passage, as in the French experiments.

Maximum temperature reached in his own tests exceeds 32,000 degrees F., Dr. Kantrowitz estimates. This may be far from the theoretical limit. By directing shock waves through a narrowing passage, other experiments of his suggest, their energy could be focused on a shrinking area. As this area approached a mathematical point, the temperature figure should soar almost indefinitely.

#### How We'd Use H-Power

If any of the current experiments should tame the H-bomb's power, just what would we do with it?

Atomic blasting comes first to mind. Dr. J. Robert Oppenheimer, wartime head of the Los Alamos laboratory, predicted the possibility in 1947. Later,

[Continued on page 254]



is the first popular priced microscope ever developed with the professional microscopist in rolladding power combinations. Irom 20X to 600X. Model 800 comes to you fully equipped with a 15X expiece and four micromatic or micromatic condenser a 5X 40X). Also equipped with an achievantic condenser a 5x aperture his a calibrated prismatic.

consultation swivel head and Processon Optical Company's newest development. Power Selector" (patent pending) Shopped complete with a castom furniture brashed solutioned ash cabinet

Mechanical Stape shows on a trusper above as fittally process of a add on to be as on a control of a control

Ton Can Own This Great New Microscope | St. 2 | St. |

Box-to extremely of the imported wheresexpo are the property of Pre ex D: that Company has Abgeles and are praincipal by U.S. Pairwill bending

### MECHANICS if you service...

STAGE

. .

SHIPS

CARS

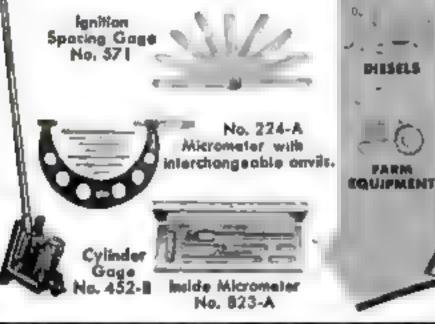
TRUCKS

AIRCRAFT

DIESELS

Mechanics who get the best jobs - and the biggest pay checks - always use Starrett Tools. Starrett precision tools will help you do better, more accurate work faster and easier. Choose the right tools for your job from the complete line of Starrett Tools for automotive. marine, aviation and farm equipment maintenance. Send the coupon below for free catalog.

## Starrett roots



### SEND FOR THIS FREE BOOKLET

packed with helpful service hints — describes and illustrates a complete line of tools for better, more profit-able servicing. Send coupon for your free copy.



Please send my free copy of Starrett Catalog A.

Name..... Position....

### 754 POPULAR SCIENCE

### Can We Tame the H-Bomb? [Continued from page 252]

after the first Soviet A-bomb, Russian sources claimed that atomic explosions were being used to move mountains and hew an irrigation canal in Turkestan. Few took these stories seriously—but such feats could become reality with H-explosives. Figures are startling.

If unofficial guesses are right, an Hbomb equivalent to some 4,000,000 tons of TNT was exploded at Eniwetok last November, Now, suppose this enormous energy could be expended in driblets. By standard blasting practice, 240,000 tons of ordinary high explosive would have been more than ample to blast away the 240,000,000 cubic yards of material excavated in building the Panama Canal, even if it had all been solid rock. And so it turns out that a whole Panama Canal could be dug with a small fraction of a single H-bomb's power!

### H-Powered Machines Seen

Could H-power run vehicles and machines? Conceivably it might be harnessed in jet and rocket engines-and perhaps even to drive the turbines of power plants. Steam boilers whose fuel explodes, instead of tamely burning, have actually been designed (PSM, Nov. '32, p. 40).

Smelting ores for their metals, and high-temperature scientific research, are still other imaginable possibilities.

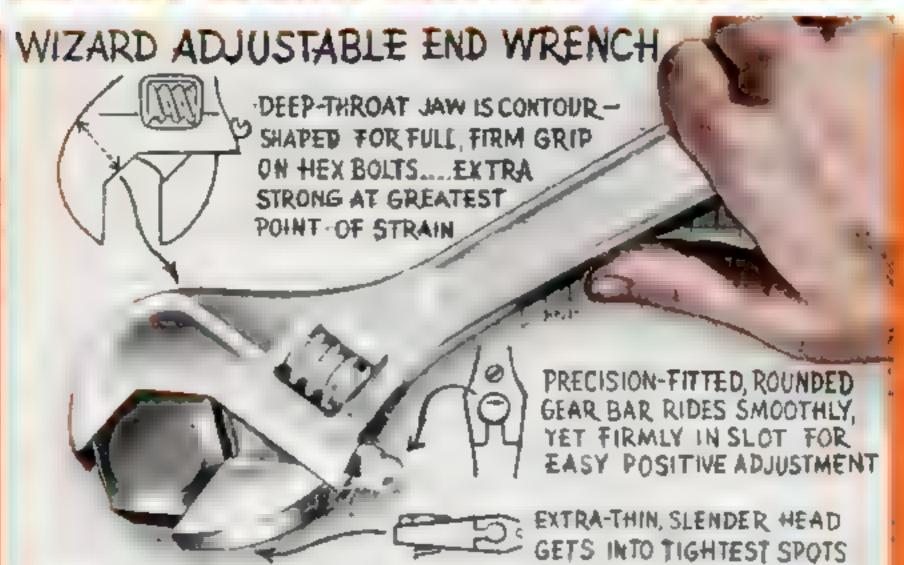
Thus may be reversed the qualms of physicists who said they hoped the Hbomb wouldn't work, but were afraid it would, when its construction was ordered three years ago. For in the end, capturing the fire of the sun may prove more of a blessing than a curse to mankind-and harnessing it for constructive ends may rank as the crowning triumph of atomic scientists.

### **Technical Rights**

LEGALLY the husband is the head of the family and the pedestrian has the right of way. Both are fairly safe unless they try to exercise those rights.-Pure Oil News.

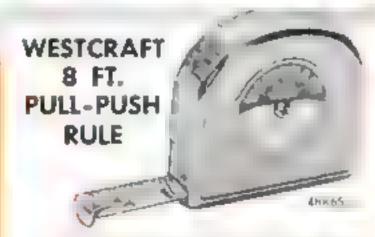
### Do It Yourself Better... These Tools Give You

## EXTRA WORK-SAVING FEATURES



A flick of the thumb is all you need to make this one wrench fit a wide range of nut not be the sets. In the turn we are angle and remoded comers to be as a property to the turn of the form of the first terms of the first





Choose from over T 100

### Wizard-Westcraft Tools...Western Auto

STORES AND ASSOCIATE STORES

NOTE Western Auto Associate designs own their stores and set their own process terms and conditions. Prices may vary due to differences in focus conditions. If you do not know the sociation of your nearest Western Auto Store write Western Auto Supply Co., 2107 Granu Rantas City Mo.



Heat treating makes it tough."

Originally tough forged for professional craftsmen



PERFECT BALANCE

If your dealer cannot supply you with Palmer Hammers, drop us a card for our circular.





### New Queen Dazzies the Motor World [Continued from page 112]

Oyster Bay, N. Y., Peggy's western hemisphere distributors, would be pleased to let you have one for \$17,500 to \$19,500. She'll have four carbs, magneto ignition, and an easy 135-m p.h. cruise. You'll have your choice of swank bodies by various French and Italian coachmakers, Compression ratios, transmission and rear-end ratios, and seat dimensions will all be tailored to your taste. This price is roughly comparable to that of such other fancies as Ferrari and Bentley.

Whether there's a U. S. market for a two-passenger car costing as much as four or five Caddies is unknown. Ricart, an ex-Alfa Romeo engineer, and ENASA, a respected manufacturer of buses, evidently think so. In selling gilded sports cars the competition record is vital, of course, and ENASA has entered a team of Peggies in this month's Le Mans race, the sports-car world series. The railbirds concede Peggy a fine chance but point out any new design is handicapped in racing against "debugged" machines.

What's it like to drive? If you are an old hand at sports cars, Peggy is purely exhilarating; if you customarily drive an elderly Plymouth, you may tend to become unsoldered. (After a session with a Pegaso, this writer drove his carefully tuned Mere home with a distinct impression of waltzing with a drugged fat lady.)

Climb behind the almost-vertical steering wheel and you'll find yourself in an artfully calculated cockpit. As in combat aircraft, there is sufficient room for a sixfooter to do the needful but no space to loll around in indolent poses. The seat is bucketed enough to keep your bottom from drifting on a hard turn, and the padded side ledge locates your left shoulder. Loosen a knurled collar on the steering column, slide the wheel in and out until it feels right, and lock it there.

Cockpit check. Drop your right arm naturally from the wheel and it will come onto a finger-indented knob atop the stubby shift lever. Study the shift lay-

[Continued on page 258]



### METAL TREAT is also on excellent rust preventive and metal pre-primer

Just rub on concentrated Metal Treat and unnightly, damaging rust comes right off automobile chronic, tools, outdoor furniture, machinery and other metal surfaces. And, before you paint any metal surface, prime it with diluted Metal Treat to

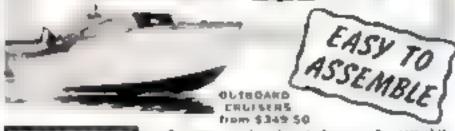
prevent rust and make paint stick (12) oz. bottle makes full gallon). If your paint or hardware dealer doesn't have Metal Treat vet, send \$1.00 (check or cash) to THE KLEAN-STRIP CO. 2576 S. Lauderdale, Memphis 6, Tenn



A quality remover by the mokers of KLEAN-STRIP

JOIN THE FUN-SAVE 50%

# **BOAT K**

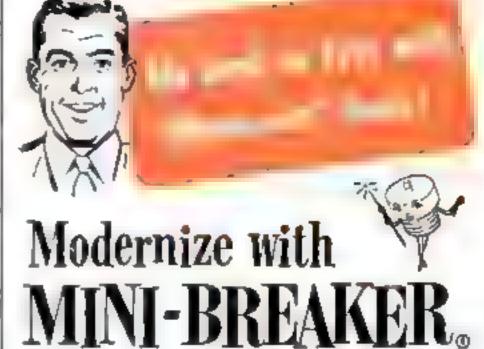


See our complete line before you buy! World's most complete line of real Performance Impts: Dirighter, Skiffs, Fontain Rocers, Runebouts, Outboards, Cruisers Exclusive features, makage dny parts plus bress screws. Also marane hardre, littings, accessories and quality points.

Catalog plus book at "Boat Selection Operation & Maintenance" \$1 00 SEND JSc for World's most complete Catalog of Full Racing and Speedboot Accessories, general book hardwore, filtings, points, corrections and early, kits. Also new "ARMOR-GEASS" covering. material for boots. Catalog plus booklet "How to Faint, Outfit and Care For your Boot" send \$1,00

Over 100 Modern plans and full size patterns. Rusing classes, cruisers, inboards, outboards, sail boots. By famous designers. 6 to 30' DESIGN CATALOG only 354. For Design Catalog plus boot building handbook send \$1.00.

CUSTOM-CRAFT (DEPT. B ) BUFFALO 7, N. Y.



... the amazing new Permanent Circuit Protector that fits like a fuse in standard Edison base fuse sockets t

Imagine! A brand new permanent type circuit protective device that can actually be used as a direct replacement for expendable "one-shot" fuses! That's MINI-BREAKER! Fits right into your present fuse box. No additional equipment to buy, no special wiring required, no installation or service costs?

· GIVES YOU PERMANENT, POSITIVE PROTECTION! No danger of electrical fires with Mint-Breakers on the job. Because this thoroughly tested device safely interrupts excessive overloads and short circuits . . tripping instantly on "shorts," but with a built-in time lag to handle temporary starting loads and line surges, 100% trip-free. Yet, as soon as the circuit is safe again, all you have to do to restore electrical service is press in and release the shock-proof reset button! No fuss, no bother. Never need be replaced!

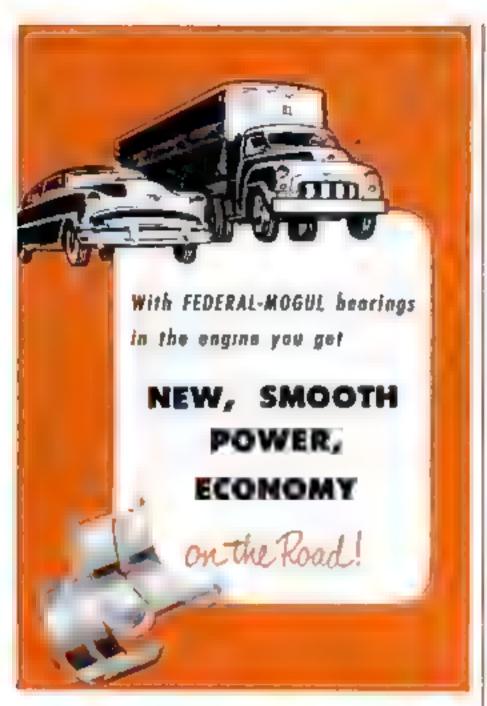


LISTED BY U. L.1 Yes MINI-BREAKER IS a precision built pretested, permitent "Circuit Protector" It's safe, convenient economical And i s the only device of its kind ever to be listed hy Underwriters' Laboratories, Inc. 1

15, 20, and 30 ampere for A L service oaly up to 125 voits maximum,

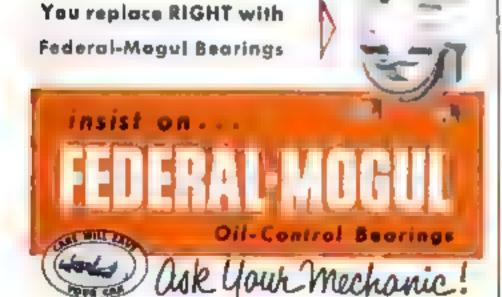
SEE YOUR LOCAL DEALER or send for complete information today!

Please	rush me full details on new Minit-BREAKER	todayl
TANK .		
ADDRESS		
CITY	ZOMÉ ŠTATĖ	



# The Best Known Engine Bearings for all Replacement Service!

Is oil-pumping stealing from your car or truck performance? Oil pumping starts with worn engine bearings. Replace 'em! Restore oil-control and fine performance with Federal-Mogul bearings, engineered for the job of oil-control! FEDERAL-MOGUL SERVICE (Division of Federal-Mogul Corp.), DETROIT 13, MICHIGAN.



### New Queen Dazzles the Motor World [Continued from page 256]

out that is cut into the top of the knob. Spring pressure centers the lever where second gear is a straight punch and third a straight yank; at right are reverse and low, at left are fourth and fifth. Now get your feet oriented—the stiff clutch, the firm brake, the big, long-travel accelerator, which looks like the clutch or brake.

Hit the key under the spiral arrow symbol and fire up. Wait a few minutes for the "Temp. Agua" and "Temp. Aceite" pointers to break away from their pins, an interval you can spend doping out the metric-system Spanish on the gauges. The clock, ammeter, and "Gasolina" dials give no trouble. On the tachometer, note where the needle will fall at ranges above 4,000 r.p.m., where the engine really leans into it. At the speedometer, mentally prefabricate a few handy kilometers-to-miles conversions—100 k.p.h. is a bit over 60, 150 k p.h. is around 93, and 180 k.p.h. is too fast for your aging bones.

Glance at the "Temp. Aceite" and "Presion Aceite" dials to make sure that the oil temperature and pressure are coming right, Jazz the gas very lightly and notice how the revs rocket up instantly, with no split-second gasp at all, and how the twin pipes give out an

authoritative yawp

Roll it. Ship into low and ease off. (If you don't gentle it, the first few starts will give you a cockeyed feeling that some-body behind is coming up fast and braking hard to keep from smacking you—but it's really just your own wheelspin.) Climb up through gears to third or fourth and be very wary of over-steering.

Peggy steers so fast that even sharp curves seem to be negotiated by wheel pressure, rather than actual displacement of the wheel rim. And be on guard against your pot-hole-avoiding reflex. That much wheel turn is apt to end you up going back where you came from.

Plainly she's no car for women or kids—driving it down to the corner for a pack of cigarettes would be a little like flying a jet to the barbershop. This is not at all

[Continued on page 260]



### 8490 Lyndon Ave. • Detroit 21, Michigan

### TILE YOUR WALLS

.. Yourself!

### with WILSON Fine Plastic Tiles

Now you can bring the easy-toclean warmth and beauty of plastic tile walks to your kitchen, bathroom, workshop, playroom . . . and do it all yourself—quickly, easily, economically. Choose from the many glowing colors of WILSON exclusive LOCKBACK—the extra-

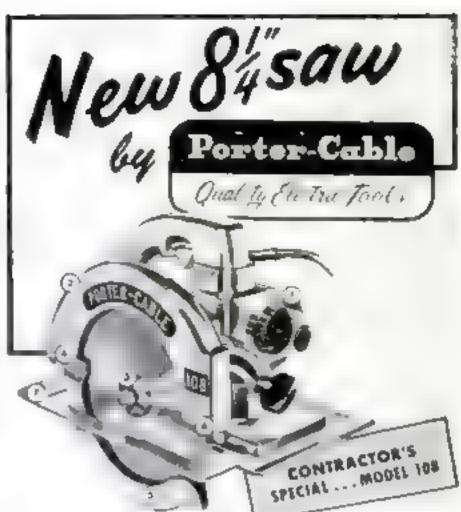
thick plantic tile that locks mechanically to the wall, yet requires less mustic than ordinary tile. Or, for budget installations, use WILSON ECON-O-TILE—just dab mastic on the four dots on the reverse side and press the tile in place. Remember, all WILSON Plastic Tale is guaranteed never to chip, craze or crack, can't fade because the color is all through the tile. You can buy WILSON Plastic Tiles in standard 414."

square bevel tiles and in diagonal, corner, base and other accessory tiles to work out any design. No special kit or tools needed!

WRITE for WILSON Tile Booklet \$63 and

WILSON PLASTICS, Inc.

Sandusky, Ohio



### No other saw gives you so much for your money \$

This professional Porter-Cable Saw incorporates more advanced features than any other saw — at any price!

It cuts deeper than comparable 844" saws — a full 246" at 90°. It's rafer four ways, its power whizes it through long rip cuts — beavy cross cuts — accurate compound mitres. Cuts off 1" x 10" pine in 1 second — 12 times faster than ordinary hand sawst It's an investment that really pays off.

DNLY

### More-For-Your-Money-Features:

- Mere Pewer Bigger motor with higher amperage develops 10% more power.
- 2. Lighter-Lightest saw of its type on the market. Weight only 1312 lbs. takes less muscle.
- 3. Ekk-proof Clotch-Exclusive eliminates dangerous bick-back when blade hits hard spots.
- 4. Blade Guard Lift Lover-Pulls back guard without risk while blade is sploning.
- 5. Cam-Action Goard (patented)—Provides steady, full retraction—gets rid of extra push to overcome "bitching."
- 6. Auxiliary Front Guard—Exclusive! Automatically covers section of blade exposed when set for light cuts.
- 7. Extended Suse—Lets you gut in either direction, on either side, when notching or trimming roof overhang.

Get all the facts on Porter-Cable's new "Contractor's Special" — see your dealer . . . or mail coupon today.

Parter-Cable Maching 1466 N. Selina St., (In Canada: Sean Please send con Please send con Security Contractor's Special Contractor Contr	syracuse &, N. Y. Syracuse &,
Norse	The state of the s
Street	LoneStule
City-	

Manufacturers of Speedmatic and Guild Electric Tools.



For years Archer Pol-mer-ik has been the linseed oil chosen by more professional painters than any other for paint reducing and brush conditioning, Pol-mer-ik has been

> super-treated by a special polymerization process which reshuffles the oil molecules so they are interlocked. This gives you a tougher, more durable paint film than ordinary linesed oil. When you reduce your paints with Pol-mer-tk, they brush out easier, level out better, have a smoother, more dirt-resistant surface, and give you a longer-lasting job! Next time you paint, use Archer Pol-mer-ik Linseed Oil. You'll get better results!



# PROTECTS MOST ANYTHING

A few of the 101 HANDY USES:

- Preserves tools and bandles.
- Refinishes antiques.
- · For natural wood finishes.
- Softens stiff putty.

Yes, Archer Pol-mer-ik is a real Handy-Andy belper that saves you time and money by doing the job of a dozen specialized products. The handlest single product in your home!

### FREE! 101 Money-Saving Ideas!



Get your copy today. Shortcuts and pointers from the "pro's" based on practical experience. Free! No obligation—just drop os a card today. ABCHEL-DANIELS-MIDLAND CO.

604 Rosnoke Building, Minnsapolis, Minnesota

### New Queen Dazzies the Motor World (Continued from page 258)

like the ordinary sedan that rather softly mulls over your recommendations on where to point and how fast to go. This is more a machine that nervously embodies your own reflexes, and has a wildly heightened response to your own muscles. Think of 90 m.p.h. and (whee) you're doing it; think of that curve ahead and (whee) you're around it.

Now work Peggy around some increasingly harder turns, feeding gas as you go. Notice how slick she is at road-keeping and cornering. Curve-speed combinations that would roll a stock product into a crumpled ball don't even bring tire noise or lean. Even if you do manage to break the wheels loose, a touch of power or an infinitesimal easing of steering pressure ties her right down again. She takes curves as easily as the white line on the road.

The ride is good, smoother than that of most sports cars. She's firm but doesn't pound on washboard or holes. There is little pitch, astonishingly little considering the wheelbase is eight inches shorter than a Model T Ford's. Shave into that turn ahead, off the concrete, off the rough edge of the macadam shoulder. She smoothly takes blips without bottoming.

Now perhaps you might feel out that engine a bit. As you wind it up the accelerator stays sensitive; in fourth or fifth gear at 150 k.p.h., quick pressure on the gas will still jerk your head back. In the reaches above 4,500 r.p.m. that four-cam engine begins to sing, and the blower joins in an octave or so higher, and you idiotically chime in wheeeeeeel still another octave up. Give her a few hard applications of brake and savor the smell of hot castor oil.

Peggy is a remarkably able car. If you like that kind of thing, better peer into that teapot on the mantel.

### Meeting of Minds

Two psychiatrists met on the street, and one said to the other:

"You're fine, how am I?"-The Right Hand.



From plans to finished job in a single weekend. This smart new table is that easy to
build with Douglas fir plywood. All you need
are ordinary tools. Douglas fir plywood
takes any finish. Won't split, chip or crack.
Get step by-step plans from your lumber
dealer or send 10c to Douglas Fir Plywood.
Association, Tacoma 2, Washington.

# Plywood

Lumber dealers now have new smallsize Handy Ponels in self service racks. Easy to use Handy Panels are quarty lested, grademarked Douglas fir plywood.





Favorite of home owners and craftsmen for 20 years' SPEFOY NPRAYER gives your work that professional paint hoish everyone admires. Sprays paint, enamel, varnish, lacquer, etc. . . . 4 to 7 times faster than hand brushing! Lightweight.

\$3650

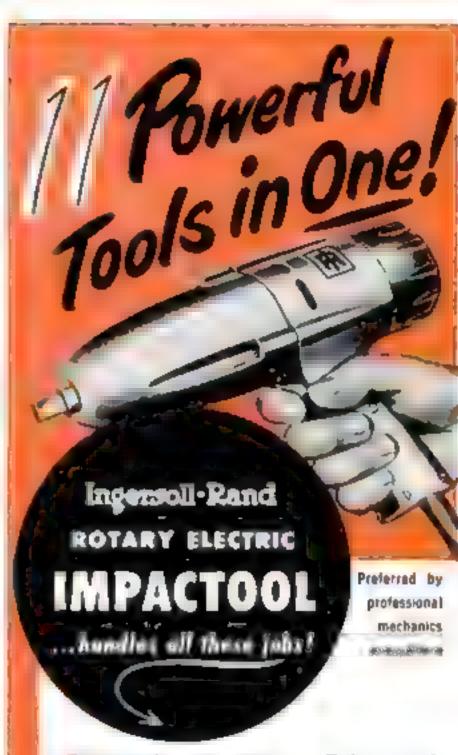
Less meler

portable, uses any & H.P. motor. Improved disphragms principle assures clean, oil-free air. You'll find dozens of time and money saving uses for SPEEDY SPRAYER, including apraying insecticides 2.4 D and DDT Complete outfit, without motor, only \$56.

At leading hardware, lumber, and auto supply dealers. FREE write for handy hooklet "How to Spray.

W. R. BROWN CORPORATION

2637 N. Normandy Ave. # Chicago 39, 11



\* Runs and removes nuts \* Drives and removes studs \* Drills \* Runs wire brushes \* Reams \* Does hale saw work

· Taps · Orills brick and masonry

 Drives and removes screws · Drives wood augers · Extracts broken cap screws and studs

Powerful, lightweight, compact, you'll do more jobs faster—up to 90% on nut running—with a professional I-R impactool. Motor can't stall—can't burn out. 1900 rotary impacts per minute do ail the work without kick or twist to user!

#### USES STANDARD ATTACHMENTS-110Y-720Y AC-DC

3 S ZES fit every need... 40, 80 and 340 (extra heavy duty) S ze 40 impactool only \$120,00, also available in metal kit with multi-purpose attach ments. Sold by all leading automotive jobbers and industrial distributors. Ask for a demonstration or write for catalog.



Dept S-6, 11 Broadway, New York 4, N Y

MONGHATORS OF HIPACTORIS AIR AND ELECTRIC

### to make boring jobs easier

# ter IRWIN auger bits

Irwin — the original solid center auger bit. Precision made of special bit steel. Hardened and tempered full length to stay sharp. Cuts fast, clean, accurate holes in any wood. Sold by independent hardware dealers only Ask for the best — ask for Irwin



frein Bit Sett — hardwood box, er plastic rolls. 6, 10, or 13 bit assortments. Sizes 1/2" to 1". An ideal gift for the handyman.

IRWI

wood boring tools

the original solid center auger bit screw driver bets

Contor Anger Sit —
elses Vi \*\* to 1 Vi \*\*.
Double-cutter type.
No cleaning, so

binding, no chowed

IEWIN Expensive filts

- two types, small and large sizes. Sering range 1/6" to 3". Drop forgad, accurate, easily adjusted. Two putters with each bit. As excellent all-purpose

PREE BOOKLES

wood-boring tool,

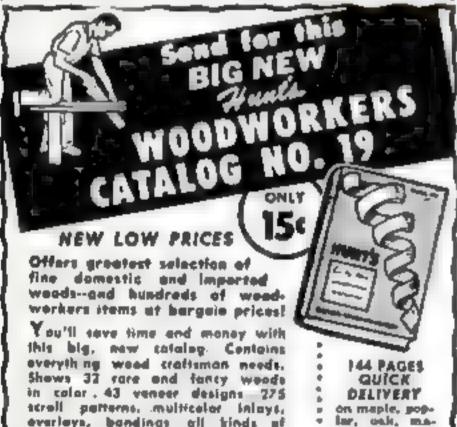
tolls how
to solact,
won, core
for wand
augus bits,
itail nome
and address
on pasteard to
brwin, Dopt, 11,
Will mington,
Dhia, for your copy.

hegany red cedar, cherry,

walnut, and

all properly

seasoned and



everything wood craftsman needs. Shows 32 rare and fancy woods in color. 43 veneer designs 275 scroll patterns, multicolor inlays, everlays, bandings all binds at tools, mechanery, cabinet hardward, promeents, mouldings and pages of volumble tips, ideas, information, instruction. Send for your topy NOW Only 15c-relandable on your first order.

### MAIL THIS COUPON-TODAY!

CRAFTSMAN WOOD SERVICE CO.

2729 S. Mary St., Dept.86 Chicago 8, Illinois

Send me the big, new, meney-saving Catalog No. 17. Enclosed is 15c-refundable on my first order.

Zona

Name				
Said hadren				•

Address.

City\_\_\_

262 POPULAR SCIENCE



Numerals read from right to left on the Carlson 3210 RH White Chief (Conventional rules read left to right). Hold the 3210 RH in your left hand pencil in your right . . . numerals are rightside up for right-handed marking. See it at your Hardware Dealer.

Produced under patents 2089209, 2510939, 2629180.

### CARLSON & SULLIVAN, INC. MONTOVIA



### Send : Giant Automotive Catalog

MIDGET MOTORS MFQ. CO., ATHENS, OHIO



World's largest Auto Accessory Parts Catalog Over 50 000 items — Halywood Accessories. Hi Speed Equipment. Rebuilt Engines, Everything for all cars & trucks. We have that Hard-To-Get part, Jam packed with bargains, Completely illustrated (134 pages), Send 25c (Refundable)

EDITION JUST DUT!

C. WHITNEY & CO., 1917-TT Archer Ave., Chicago 16, III.

# NOW-40 different CUTS with AMAZING, NEW



# DATIO SAWINE WASHERS On Your Saw Blade

Just diel widths to cut parallel grooves perfectly smooth, No warp, vibration

GUARANTEED! At your dealer's or order GNLY direct. Give arbor size-1/2", 14", 14", 1".

Send for free booklet

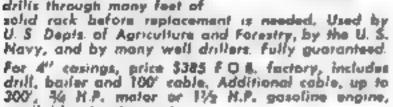
WARREN WASHERS COMPANY

Dept. 48. But 98, North End Biotion, Dotroit, Mich.

\$495 4 127

### LOW COST WELL DRILLING

Save well drilling costs...
have all the walls you need... in cellar, born or autdoors. thallow or deep wells. CON SOL's law cost well driller is easily moved, set up and operated. Sturdy and reliable, its extra-hard, quickly installed, drill insert drills through many feet of



nvollable at extra cost.

HEAVY DUTY MODEL, for 6" casings, also available at \$1295 f.O.B. factory, equipped with gasoline engine.

Write for literature to Dept. 756

CONSOLIDATED INDUSTRIES WEST CHESHIRE, CONNECTICUT, U. S. A.

#### Precision Saw

No other a circular saw has 5 in 1 SHOPAMITE a unique blade to fence adjustment, its big table area. Converts to lathe, sander, vertical and horisontal drill press, Write for free catalog.

SHOPSMITH, Days. 200-A 12213 Call Rd., Oleveland S.O.







# How to get more mileage out of your motoring dollar



CHECK OIL PRESSURE

Glance at your oil gaugewhenstartingengine, and at 
intervals while 
driving. Belownormal reading 
may indicate

leakage, very dangerously low oil level, or pump trouble. Stop before lubrication failure seriously damages your engine' Warning: Your oil gauge can register "normal" even though crankcase oil level is below danger mark.

Check the oil level whenever you got up. Oil level is as vital as oil pressure; and only the dip stick shows you if there's plenty of oil in the crankcase. Oil consumption varies



CHECK OIL LEVEL

with speed and temperature; and there's always the possibility of leakage. To be safe rather than sorry, check dip stick frequently.



Refill on the jeb. You need a good filter to keep the road dust, hard carbon and sludge that get into the oil stream from harming delicate engine parts. In time, your filter loads up . . . gets so clogged it can't keep up its money-saving

work. Before that happens, get a new Purolator Micronic\*—with 10 times more filtering area than ordinary types. Purolators are specified on more makes of cars than any other filter.

Refils cost as little as \$1.60 . . . take just a few minutes to install.

Check your oil filter every time you change your oil





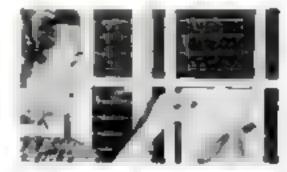
### Pointers for Home Painters



### Choose the right brush for the job!

When you're painting window frames, screens or other parrow areas, the right brush to use is a sash brush. Sash brusheseither flat or oval-shaped—are designed for the job . . . help you get better results. And a brush with bristles of Du Pont nylon makes trim work casier . . . nester.

When painting windows, protect gloss with a piece of cardboard or masking tape. Leave window alightly open during drying, so It won't stick shut.



When painting latticework, fences, radiators. always do the hard togot-ut areas first. Thus eaves you time, trouble and a lot of cleaning up , , means better work,





When painting edge-Wise on harrow surfaces, use a sash brush. It'e domgnod for the job. Using a large brush causes "fingering" (nee insert), ruins the brush.



Clean brushes with thunner after duily use, Suspend brush in thinpur overnight. Brutle tipe should not touch bottom of can. Work out thinner before repatoting.

### MAIUM DRINE BUNGRES

JOB AFTER JOB, you'll get host results with a well-tipped aylor peint bresh Durable Du Pont nylon brights point amouther .. ore clean and sanitary . . never get brittle . . . don't break off even under the roughest treatment. And nylon bristles lust from I to 5 times langer than ordinary bristles, Leading menufacturers make nylon point breshes in all types and sizes. Look for the name NYLON on the handle. Be seen to pick the size brush designed for the job.



Better Things for Butter Living . . . through Chemistry

The best brushes have: DU PONT NYLON BRISTLES





WRITE FOR PREE GUILDING INSTRUCTIONS. NO OBLIGATIONS

T. & H. Mfg. Co., Dept. M-55, 811 & 31 St., Kanson City, Me.

poeds, in a short

without special too.s

### FREE! "HANDY TIPS FOR HANDY MEN"

BOOK OF HINTS to make home repairs and hobby projects easier, 52 pages check-full of information on sanding, polishing, sawing, filing, grinding and sharpening, and the care and use of hand and power tools! Write to: THE BLACK & DECKER MPG. Co., Home Service Dept. H6S, Towson 4, Maryland.



SEND 15 TO COVER POSTAGE FOR NEW ILLUSTRATED 28-PG CATALOG X-ACTO CRESCENT PRODUCTS CO. INC., 440 FOURTH AVE., N. Y. 16, N. Y.

SEND'1	.00 FOR	YOUR	NEXT
SEIAD T	PRC	JECT	IDEA!

SPECIAL SUMMER OFFER:	\$1.00 for	one	year (é
big usues) of DELTAGRAM.	Then, FREE,	one	of these
large-scale project plans:			

•	ide-score broker, broug	
	Flower Box Designs	Tref
	Bird Fueder	24-

Hs Dusigns room Swallow House Reading Table

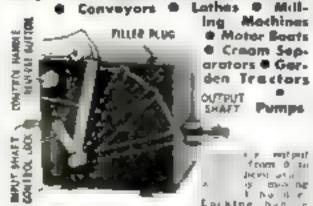
Book Trough

Check first and second chaics. Orders filled while they last.) DELTAGRAM, original and finest of its kind, contains shaptested plans, tips, techniques, helps galore. Send \$7 00 bills Delto Fower Tool Dr., Rockwell Mfg. Co., 504F N. Lexington Ave., Fittsburgh 6, Fo.

Name	
Address	City

### HYDRAULIC SPEED REDUCER

CITEM =135) WITH EIRGERTIP CONTROL USE FOR: • Reamer Drives • Midget Cors & Food Mills & Conning Machines



ing Machines Motor Souts @ Cream Separotors . Ger. den Tractors

. OUTPUT Pomps

Personal Security from 0 to is more no Do 4 e Locking han r

Phenn

T BB

maintains action. Use lossest power of 2 to 14.
If P. This Westsuphases the feat his complete of a grand de dispersion in the he surpre feeding a fixed dispersion in the second of the proposed of corpic man of reaching a legislation of respective features in the proposed of corpic man of reaching a legislation of corpic man of reaching a legislation of proposed on the proposed of corpic man of reaching a proposed of corpic man of the dispersion of proposed on the corpic of the second of the proposed of the corpic o मा देशाचा बोजर्डर who Enjoy countries a require some or far en-shaff Recommended Supar speed out in an a in R.P.M. On a 1 d suparase 7 is all that the open on so size of this said will be Committee the 24th of oil \$4.50 and for I therefore FOR The case r Hinte



ftom 2301 Medel 135 to charge 6 and 12 voit batteries-12 volts -300 Watts. Henvy

Duty Generator Push button seif start er Stardy single cylinder air cooled Continental 1 3 H P engine 2 qt gasone tank in base Ammeler Generator cut out Concea ed coil, etc. Speed and charging rate control Attractive orange an sh Weight 93 lbs Length 15 width 11 ," Height 144, 89.00 FOB Chicago

### CENTRIFUGAL PUMP

General Motors - Allison 200 GALLONS PER MINUTE



For Dra nine Basements Fire Fighling & irrigation Fuel Transfer Swimming Poots Home Water Systems

Dewetering. kinds est us bogh cor 6 D4I countrial nec and countries are recipited 2.3° type branch met win 124° type chemit outlets that bear out supported 3.2° shall Fire coulder har Hater sate engager nelly fee for one name of destroy of

Complete with full contract oils. 39.50

TYPICAL PERFORMANCE DATA				
HILL	Head Pressure	Per Min	H.P.	R.P. M
10 1	73	260	8.0	3500
io	80	3DG 4D	11	2500

10, 30, 100 3.0 5200 FREE 1933 CATALOG (& Pages chuck fu ! of interferenced was Surplus Lauriphrent Burgains for Catin towns for any and workship, Every term on one main faith v guaranteed. You save on energible up. Write testas

### WIN GHARM MULTI PURPOSE Hydraulic Pump er Motor

Manager 18 a the senes it is the free file.

trem side boulds arrive hydrothic cyl. if or a grant and stroke Will left the bis with 1000 P. 4. I has presented THE MA W WELL THE Paris 16.95 B he A 053 to N gh h S w only

### BRAND NEW

### HEAVY DUTY HYDRAULIC and AIR EQUIPMENT

Large supp y of new fatur saving oconomical bydrauf c equipment In many types and sezes time these poactive, highly efficient amough pressure hydrautees on presses, arborn, fetts beaders power sentrel, paurticolog, braker, plantic dres, aule frame alignment etc.

#### ALL ITEMS UNCONDITIONALLY GUARANTEED

The literal of the Per Mis. of 1940 is to be suitable for it and the part of t

t brage in theer out him for



32.50

\$7800 #42 Popler setten hydrau'te cytteder 4" bere. The strate Rates in aparity with \$1000 P & I have pressure is 1.2 500 Hz. Ship wit 30 Pm F O H

**EXTRA HEAVY DUTY** DOUBLE ACTION Hydraulic Cylinder

Hom #324, 25," berr, 24" stroke whis fall 10000 the, with 1000 P. H. I. Iver presente ty" pipe thrend much | |Ag" alrendprouf ground, but salted & pracedau of stret shaft. Oversit length closed 50' 1 sheet wait eyiinter turns close mounting at have sent shaft. Fratures Tle find construction. Masset Imprel-POR Chicago \$39.60

from #150 Double settin by denote of Index 7%" have 18" stroke. I se et het fant une es e minimum Ware 1821 and the no og mer P. S. J. Overe & etleth

we glid Styles Personald 18,00



D.C. GENERATORS Arms 21 19 1 Ma Hom # 176 Tire La Itales 2 Many a Page 3. > 0 h Chicago



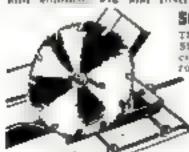
Hem #188 if you a go senior but one with our fermal a disar remains at all 657 1900. Auto the Shift Council or 6 bard Change from the 1 4 " W 4" H 4" Hermonolde drive gives when at 11 he 515 00. with rollings degreeated

18.00 Atom # 90 Tape I' I raind her 

is Vol.s. Mish by Jack & Hr nis Vol. 4. A 24 de He nta top Jack dipas no CHAP L 4 4114 hirds the he to a 35.00



SO CASY: With this new filing wand in over anyone can now sharpen any tunisme like now. When he has bardened the recent each art riplehed and \$340 TOY \$350 HI (6.47 to each out and east runs true and emonth. Jid and instructions \$2 98 postpaul. Freq serature



SHARPEN YOUR CIRCULAR SAWS

The RIGHT WAT in your own cam lable Sharpets rip cutoff hollow ground and com nat in buildes 6 0 5aws stay Prec s of neader found with correct beset easy to the left to NTEFO of h SE TS.

TRE CINCLE 4 THE RES AND LOSS. 100 or more \$2.95 AT DEALERS

POSTPAID



SUPER DOWEL CENTERS

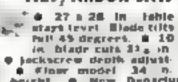
a the are consentative. These cenmake of three s Man Palent 4.1 from Fa 1, the targest made time You is only need these true and a 1 4 sontors \$1.00

A. D. McBURNEY 317 E. 4th St., Lor Angeles 13, Catif. Degt. S-30

OR.

# # 10 April 22.50





tree of heckstrew depth adjustment of flow model 34 n.
table bright of New Departure belt bearing
arbor I a in precision shaft ready to run its
on those blades. It Dutch positioning selfarian ng rip lence guide of hurdy wood steel
and statt num construction of Mg machiningbuild easily with hand tools only of Capacity build eat ly with hand tools only & Capacity and performance of floor naws seiling for peting for

\$150 00 and 40" OIL BILT Metal Parts HIS Includes Plant ball-bearing arbor cast a uninum miler gauge and rip fence guide machined tock knobs, Jacksoren mechanism with 41 s in, handwheel and all other metal

parts less bades Same this with 10" combination blade Same Ait with & combination blade of not entialled, exturn first in 10 days for refund of perchase price

Her me on Over 100 and 50 a a und feife gere mir mir fich ! GIL BLE T State by Sid on the pane No come own result of some own result at the state of spin day for a second state of the state of th poor up d approposed in the world of What's FOR FRY!

GILLIOM POWER TOOLS

P. O. Box I VF Lambert Field. St Louis 21 Messouri



BANDSAV

### FAST, EASY WAY TO DRILL MASONRY



CARBOLOY LIVE SPIRAL" Masonry Drill

### ZIPS THROUGH CONCRETE LIKE WOOD!

No more slow, tedious hammering on a thumb-smash-ing star drill. New Carboloy "Live-Spiral" drill with its diamond-hard cemented carbide tip rotary drills toughest masonly with ease won't stall, stick or bind in brick, slate, concrete, tile, cast

stone ..., any masonry around your home Makes it easy for you to drill hotes to bolt down a washer, dryer . . . put in hooks, furring strips or partitions . . . at-

tach awnings, trellises, screens, etc Get 'Handy-Man" Kit today Contains 3 "Live-Spiral" Dri.ls, '4", '3", '5" Fit '4" chucks, \$6.65 per kit. Send coupon, or see your hardware dealer.

"Carboloy" and Liva-Sotral " are registered trademarks of Carboloy Department of General Placing Company



### MAILETHISECOUPONETODAY

REPAIRTMENT OF GENERAL ELECTRIC COMPANY 11173 E. B Mile Ave., Detroit 32, Michigan

Send me \_\_\_ Handy-Man Kits at \$6.65 per kit. postpaid.

Enclosed is check or money order for.... Send C.O.D.

Sond me free folder.

Nome.

Address.



### **Nova Roller Doors**

tor passageway or storage space

INSTALLED IN JUST 30 MINUTES

Be modern with handsome, pilent, space-mying roller doors. Exclusive Nova construction features give you doors operating under fingertip control

-built for year 'round use in any climate-light, strong, warpresistant. Two or more doors enclose any opening. Each door comes complete in one carron and is quickly installed by one man ... These are hollow core, flush doors regularly gold in the finest plywood or lumber—from birch and gum to imported mahogany, for any waxed, stained or painted finish your interior design may demand. Write today for fully illustrated literature. Department 68C, NOVA SALES CO., Trenton 3, N. J. A wholly owned subsidiary of Homesote Company



FOUR WAY WELDER CO. 2326 S. Michigan Ave.

Chicago 16, III, Dept. #3 #

# GET THIS STRAIGHT you can't beat

For improved accuracy, better visibility, less breakage, use the new Empire 9" aluminum Torpedo pocket level with machined bottom groove and protected, easy-reading visits. See your dealer today for all-purpose Empire Levels.

EMPIRE

LEVEL MFG. CO. Mitwankee 13, Wisconsin 10930 W. Potter Rd., Dopt. PS

### MYPRAULIC POWER TRANSMISSION



has from se opende 0 to 556 (leveree to make them see appears 0 to \$50. (deverse to make a section) Protection and unit in the section to the form of the section to the form of the total total and the section to the section of the section

DIRECUS MACHINE SHOP "O" 1423-25 Sa. SZod Ávo., Cicara SO, III.

### RETAIL PRICE \$125.00 factory to you \$7

SUPERSHOP includes precision built S" tilting table saw, verticut and horizontal drill press, 30" laths, sender, grinder. 100% BALL BEARING. Write for FREE catalog, full details, trial plan.

POWER TOOLS, INC.



248 YATES AVE. BELOIT, WISC.

### HOW TO SEAL THOSE ISTONS

WITH SAVE \$75

Overhaul Your Car in 10 Minutes? AT YOUR HOME FOR JUST

MORE GAS M LEAGE OR YOUR MONEY BACK-

r pression SEAL in the big table la other 1981 1981 drivers who made the in in here garages pag \$50 to

PILLE By NEE PLATE F the and on their porkets

Fill E By NEE PLATE F the and on F the continuation of the Simple" Fou bet"

SEND \$3.98 TODAY in check, bush or M.O. COD's accepted! CAR-LIFE SUPPLY CO., Dept. PS-6 4784 S. CENTRAL AVE. LOS ANGELES 11, CALIF.

### EBRATION SALE!

WE'DE COLDORATINO OUR MOVING TO SAVE

HIGH SPEED STRAIGHT BHANK DRILLS SET 30 secreted #L S. Straight Shank Beilia EL from 36" to be" for be" for \$2.98

SET 100 MIGH SPEED DRILLS: 1/2" down. 131 Jo new std M. B. Dr. I.s. — 70 slightly used sharp drints, tengths up to 7" \$30 value. \$7.98

E2 different size H. B. straight shank Dellis. Not be Ly." only \$3.98

HIGH SPEED DRILLS

Va" to 17/32" WITH 44" SHANKSI

SET 10 d fferent bloc N.S.

26L br 14 34 to 17/42".

Shanks. PPD Say 34L Will fix any 44" HIGH SPEED DRILLS

L'2" to 1 3/10" WITH L'2"

SHANKS!

B Drills for less than the
price of one new Writh

ET 6 different size th. S. Brills

\$7.95 32L Up" to 1 3 /10" SET 10 different sero M. B.

33L Drille Ve" to 1-3 /16" These new and used M. S. procusion Beilin with by shanks can be used in a Lig sleet. Seil or a ky casacity fathe or drill press.

### NIGH SPEED MORSE TAPER SHANK DRILLS

IB Different fine Might Sueed Moras Taper finants for 1 three to the with the land and least. New and least, \$50 value. \$6.49 at andy

10L Toper thank 0rs to from 25 to 5 New And used \$70 be see Price \$12.95

SET 10 D Herent Size Migh Speed Mores
15L New and used, \$50 value. \$9.95

### NIGH SPEED WOODRUFF **KEY SEAT CUTTER**

SET a different also untiere, Can the used an equipment metting of the quiter or cercular naw. All will be but and to the stands, widthen the but, san up to 1 Here and seed. Ppd. \$3.95

#### HEM MORNLED STONES

SET Mixture of 27L ad Stones ah an ku-\$2.95



#### SPEED STRAIGHT SHANK HIGH CHUCKING REAMERS

SET 30 Different Size Night 164 Chucking Reamers up to Ly New and used. \$7.95 Priced at only

SET 15 Orfferent Size High Speed Sire ont Shank Litt. Chucking Reamers from to to 1" New and \$7.95

### 6 SLITTING SAWS WITH MANDREL

melderent.



7 selected, sharp H. S. \$1 three Saws as shave to use an your own manifest or milling machine New and used. Pod. \$4.05

#### AIR TANK-REGULATOR-MASK

### Tunb, 5 4.5". 104 cu. in. vel 500 PS: \$1.50 aD2 Tanh, 61%" a 24 500 cu. in. vel. 800 PM \$4 25

a Demand Type Regulator remplete with 800 PSI pressure gauge. Vita above tanks \$1.50

a Mack complete with 14" of hose. ONT H Abave one provide to take compression requirement autable for air tanks, compression requirement, diving the la, rid.

New Retary FILE MIX 7 different pcs., High Speed Va shork. \$4.49 PPD



#### 1/20 H.P., 110-VOLT MOTOR

80 cycle A.Q. 1950 hPM. Brotte buth baaring. B 18" staft. Wt. 4 ba. Beed, purranteed\$3.50

2 M. F. MOTOR 24-velt, 20-amp. double and hall-bearing shaft. WL. 18 lbs. \$7.00 FO.B. To sa, serly



#### NEW VICKERS MFP, 6 H. P. Hydraulic Meter Unit to compact, pow-

\$1.79

S mat, per min. at 3000 Resil 1200 PSI, Positive d ap accessoil. Anole type. Ented at 8 16. P. Potatas either direction. Unit can also be upon as a pump. Here is the f neat hydraulic motor even able at a fraction of its new cost of ever \$200.

MENU VICKERS NYBRANLIC MOYOR, 445 or P. Ser at No. MF LOTILIDO BC FZ, 24. in. dispracement per cev. 378, 3400 p.p.m. LDOO P.S.I. Unit similar to abbve only with ome for displace-ment and M.P. Only .... \$16.50

### BARGAIN TOOL & SHOP MIXES-PPDI

- . 30 GRINDING WHEELS 44" arker, 4" d amplet man.
- a 200 BERINGS All types
- SURPRISE WIR! Over \$0 pee, for your \$4 per drill, including rotary lifes, drills, bits, rahmers, grinding wheels and arbers for our customers who like pleasant our-arrars. Your money been if \$2.98
- by N. B. Butary Files.
- 6 8 8 8, TAPS, 264, & Pepe up to 52", 2517

MIGH SPEED COMBINATION DRILL AND COUNTERSINKS 21 8 selected since from Al to F2

19/66" de'il a 1/6" body to 3/16"

21 sr(i) a 7/16" body 50" angle of counters sh. New root on these counters in the 73c to 53 10 ss. Priced 33.78

YOUR MONEY BACK on receipt of merchandine of you are not not blind. At mine, minime of new and reconditioned unless specified new All british (except these specified F.O.S., OFTEGIT are shipped Post Faid new ag you up to 20%, on total delivered cost.

Dopt. 7667 GRAND RIVER TOOL CO. 500

Write For Free Cal-alog Dundy hing Thousands of Spr-gain Culling Too's,



Amusing new-type cutting discs save time and labori Actually "Two-Tools-in One", the remetile Monta Moure in an amazing work saver! Try it on your own tawn, on approval, for an extended trial period. Its live, precision mechanism first gathers, then smoothly cuts a clean 16" swath through gram, dandellons, tall lawn weeds. Cuts right up to walls, fences, trees and under over hanging shrubs practically eliminates hand trimming! Cuts steep boths easily! Cutting discusses now both Bell Cleaning and Self Sharpening. Drive than assumed on permanenty lubricated, sealed bearings. Hundreds of thousands in use. Huy differt from factory and save. Owners Cooperation Plancan repay cost. Write teday for full details on finited "aportal Price . . . Extended Trial Offer", Bold Direct Only.

MONTAMOWER DISTRIBUTING CO. P.S. 36 KEELEA BLDG., GRAND RAPIDS 2. MICH.



MAINTAINS STAND, ELIMINATES AND OF Send for Free Vital 32 page book "OIL FACTS (with bonn fide \$1 000 00 offer on page 30). Gives you complete "Reclaims" itary and details of our extraordinary 90 DAY NO RISK TRIAL OFFER

U S. BUREAU OF STAND-ARDS, Bul 86 Stotes. does not wear out - mechanically "

### RECLAIMO MFG. CO., INC.

SOES Eleten Avenue Sept. P. C. Chicago 30. Illinois Wei, Schwnige, U.S. Puts. (757223, 1834654, 2068475,

### R SURPLUS ithinia

SAVE UP to 90%

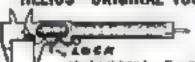


B.C. GENERATORS

**68 300 Amp. Senerator.** 24 to 32 voits. 2500 RPM. Per building your even are welder. lighting plant or motitic radio communication unit. Wright, 50 lbs. Approx. GOVT. COST \$430. Yours now for \$35.75.

MAKE YOUR OWN ARC WELDER Complete make-up package furnishing of time New Pt Generator 200 Amps, one glant togges switch, one voltage regulator and a wiring diagram chart showing conversion of Afretait Generator to Art Wrider Nothing clas to buy Special—WHILE THEY LAST—632 SO

### "HELIOS" DRIGINAL TOOLMAKERS VERNIER CALIPERS



LETRA PRECISION Imported for the really systemal mechanic who must have the test flec-

at Lockheed, Douglas, Bendin, GM. R. A. GE Al.L. NEW and at low line prices but country in time prices but country is time faces. I 1000 want i 128 manufactures. Its hardy of de soil and thumb wit Quick accurate depth A \$15 value, it a yearn complete with leader currying case for just \$6.78.

#### MICROMETERS

Chrome plated, precision engineered, carefully tooled to give long life. All new 0-1" capacity=\$2.28 ea. | 2" capacity=\$3.80



RIVET SETS Universal type, case hardened tips. Set of does will head up only branier or round head rivet from 1 1/8" to 1/4" With adapters for the gun or hand use. All new-cost Gavt, approx. \$27.00. Contplete 12 piece set (wt. 2 lbs.)

#### U.S. BAROMETRIC ALTIMETER

This U.S. Gauge Altimeter to breife in car or plane. Teles altitude correct y guaranteeri 1, a NEW: Trice altitude correctly guaranteed it a NEW's Approx. Govt. Cost \$175 Get 'gon while they last for just \$7 00.



SEND 25c for BIG - NEW - 1953 CATALOG

Order or Cash Shot deposis on C D to orders, Prices F Q.E. Cu vet City, Calif. unless otherwise stated,

### 



THE HEAD CAN'T FLY OFF! Estwing "Unbreakable" hammers and hatchets are forged in one piece from tough tool steel. Grip is genuine leather, proven most comfortable and durable. Used by the carpenters for 30 years. Ax \$4.50, hammer \$3.65. At all leading hardware stores. Write for FREE Catalog, ESTWING MFG. CO Dept. P. Rockford, Ill.



Operates spray guns rock drills, tompers poving breakers sandblasting Uses only I gollon of gos on hour! Save Money-by d your own Smith Air Compressor! Famous the world avert Cap 60 to 41; pressure up to 100 the per sa neh Just order the Smith Compressor Head and Accesses s of with complete instructions for assembling. All you need a a fact Mata and shop factities. Head equipped with high speed compressor varies, putomatic un anding and lding

Write for complete informationi

GORDON SMITH & COMPANY, Inc. 405 College Street Sowling Green, Ky.



### HOBBYISTS! SHOPMEN! Succia

PALMGREN "HORE-E" Retary, Index, Milling Table Ideal for Model Parts or Shop Work

Religion and Mortine on drill press of lathe. Believe and Mortine on drill press of lathe. Be Table, 4" Cross Feed, 360" Rotation, Accurately Graduated Bulls I. table Order NOW! BAYE \$100 Only \$54.10. I was Rolary Feed \$35.72 Western PROSS. 2" Tool (Trease 635.72 Western PROSS. 2" Tool (Trease 635 CHICAGO TOOL and ENGINEERING CO.





### 多数品额有多数品数多数

Complete with everything Ready to plug in 110 vo to AC 15 10 Amps. 3 heats Welds meta from 3 16" to 14" using 1 16" to 3 32" standard rods. Guarenterd unconditionally 10 day trial No C O D Does everything welders costing up to \$75 00 do. Buy direct and save.

ESSAY MFG. CO., INC., Dept. 47, Quincy 69, Mass.

### IN YOUR SPARE TIME

UP TO SAN A BAY IN YOUR OWN BUSINESS EMY to start report cash becomes at home with the How BE-SAM shurpeoing and setting circular saves granding plants and points known. Low Dest. noty \$15 down Start in work the day your BELSAW arrives. He an-

transa apulat. Hendruts of jubs in your neighbor and, Soud Taxtey for Eron Beack, Infortune Security .



BELSAW MACHINERY CO 4406 Field Bidg. Ranges City 11, Mo.



Does so MANY Jobs EASIER! A squeeze of the hand techs laws to work with Yon-Grip. Won't slip! Turns, twists, bends, pulls, cuts, ratchets. A whole tool kit in 1 trim tool! 7" and 10", only \$1.85 to \$2.60 at your design

Made Duty by PETERSEN MFG. CO., Oapt. P-6, Ballitt, Nebruska



GUMOUT DIVISION

Pennsylvania Refining Company
2092 Lisbon Road
Cleveland 4, Ohio
Butler, Panna. Edgewater, N. J.
Refiners of Penn Orake Petroleum
Products since 1878



Hang wallpaper more quickly and accurately by using ADHESIUM. This remarkable product prepares the wall surface so paper slides into place smoothly—patterns can be matched easily. Added to paste, it makes paper adhere tightly, prevents cracking and opening at the seams. Get Adherium—at paint and hardware stores.

Write for informative leaflet Colenial Works, Inc., 229 Norman Ave., Breeklyn 22, N. Y.

### **ADHESIUM®**







### Slickest Tool You've Ever Seen!

This unique new combination grinder and hone enables you to put a perfect edge on almost any tool or implement - from knives, scissors, batchen, garden tools to plane blades, chisels, drills, Add a wire brush or buffing wheel and you're set to clean and polish a host of equipment

The 6" grinding wheel turns 3000 RPM, the 5" othtone hone (with 120 and 320 grits) turns 110 RPM Tool is ruggedly built - grey iron base, sealed for life ball bearings and Othice bearings. Weighs 22 lbs. Operates from 1/4 to 1/3 HP, 1725 RPM motor. See your Atlas dealer, or write for literature. Price F.O.B. Kulumazoo \$31.50.

### ATLAS PRESS COMPANY

KALAMAZOO, MICHIGAM

DEPENDABLY OBALITY TOOLS SINCE

HOW TO ..

SET UP and KNOCK DOWN

# SAWHORSES



USE STRONG, PRECISION-ENGINEERED

NU-WAY SAWHORSE BRACKETS

Set up or knock down sawhorses in lig time! Carry them in your car -or store them easily - the modern way . . . the NU-WAY!

SEE Your Hardware, Lumber or Paint dealer NOWI

ONLY 1.50 11.60 West] of Tennes

THOMAS PRODUCTS CO., 8490 Lyndor Ave., Detroit 21, Mich.



### Money-Making Tools!

It's easy to own the same "pay-off" tools used and endorsed by America's top-carning mechanical You can start building your own hit with besic Snap-on sets-edd others any time. Never sold in stores-direct to users only Send today for free catalogi

Snsp-on Tools Corporation 8868-F 28th Ave., Kengaha, Wie.







The considere sharpened leasured in FORTLNE and other leading rungs fames. Anyone can use gunfahteril presse grading and spacing of tee h Operates on your own power table. Complete with patented Indea Plate for the office of the patented in the principle of the patented in the principle of the patented in the p haves time and money Send chief cash or money order. Wa

Medel 6-12P \$16,50 Pertperd

buy postazi QUICK-WAY Saw Company 13 Siverside

Corning NY

IUTH BEND



Send for catalog on Lather (9" to 16 25 Shapeta or Di Il Presses SOUTH BEND LATHE

South Bond, Ind

"BEST SANDER P'VE USED IN 40 YEARS OF DECORATING" Follow Master Decore ret the amax best r dry
sanding Low cost
41 deslers or Circuar Free 878, 30
com Hept 6 63.
Oxford, Michigan,



You can peel paint fast and easily! With Paint Dozer you soften and peel old paint in one continuous stripping action. You get a clean, bare surface ready for repainting. And, there a no hard scraping, no messy or dangerous chemicals or flame!

In tests, Paint Dozer pocied 43 coats of paint in one stroke! Flat, curved or grooved surfaces . . . house siding, boats, cabinets, floors, woodwork . . . you can poel them all better and easier with Paint Dozer'

Paint Dozer operates on 115-120V A.C. or D.C. household current. Its sturdy stamped-stool casing and heavy-duty ceramic element assure long life, even under daily use,

Order from your hardware or paint store, or write today for first derivery. You must be satisfied or your money back!

LECTRO DIVISION, OTTO KONIGSLOW MFG. CO. Dept. 3-C, 2189 West 26th Street . Cleveland 13, Ohio



Gleaming streemlined exteriors sheath a world of living comfort that is completely furnished and ready to set-up housekeeping. Modern all-steel kitchens feature built-in cabinets, sink refrigerator and range. Automatic heating system, with scientific insulation, assures wermer winters and cooler summers. America's finest mobile home, every New Moon includes everything for BETTER LIVING ... for housing, travel and vacation fun.

Learn oil about the advantages of New Your mobile bring - hour you can enjoy complete living comfort and concentrace in a New Moon on our Takearent' payment plan Il ette for "Adrentuces in faring - it tells all about furbibential Licing ma Year Moon, Ho F H L L

REDMAN TRAILER CO., ALMA 30, MICH.



### All the Facts You Need About PORT

New CATALOG IL tober and to the and to the His right house for the set the green to be a factor to be seen to be a factor of the second to be seen to be a factor of the second the whire to asserb to be greated and electric some, buit sunders, orbital sanders, due

produces the fisher to term planes At we be in the growner of the the last of the section of the sect manufacture and the same of the age and handling, Send for your copy NOW

PORTER-CABLE MACHINE CO., 1686 N. Suline St., Syrecuse S, N. Y.



Go anywhere with trailer lype gos drive wulder

Don't at appartunity past you by! Set up your own welding shop- get in on one of today a fastest prowing biggest paying businesses Opportunities are unlimited

Have your men 816 PATING business.

Hobart s mol t rd ing makes learning easy, yet gives you an all round we der of top performance and dependability. Write for free book of Beiter Weids

Build a GOOD business rape lation with

Special For The Month

ARMY PARTS CLEANER U Mara-Jous Air Solven: Cleaner

parts perfectly in few seconds.

ing mailtons tarins

Por garages factories Dil-

Heavy galvan and limb 25° x2 "x2" on a pe legs ty foder operated id Ar turbula.

105 The | BALE \$20.05 Ppd

the over \$100 to

HOBART BROTHERS CO., BOX P-63, TROY, ONIO



Air COMPRESSOR UNITS

Re la 3 ste sep de unit de Debase Air
Nits tempelment unit relete guistes, etc
\$45 60 m Air tempe. I cyl. compressor
\$20.50 motor occasore es cel. \$4 95
Air pressure regulator \$2 65 Pap off
tellet \$1 55 life in white \$1.50.



Star I pumps for every use Free advice Centrifugals. 25 pp. \$10.50

• Repair brunze se f prim use 6 pp. m. \$14.75. • El Prepaire until 6 for entile orchards \$54.50

POWER PLANTS and GENERATORS

Save to 71. % on 3 % the plants & 1 % SSS1; 2 KW \$289; 1 KW \$179 • Generators, 3 KW, \$259; 8 KW \$189; 2 KW \$139 1 KW \$125. Many other values

### MYDRAUGIC RESERVE Bu ld loaders, d ggets

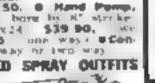
lir nd new units • Teactor Pump 100c PS1: \$45 S0. • Hard Pump. Pump 1000 PS1; \$45.50. 8 Mand Pt \$10.50. 8 Cylinders, 3 hore by R' was one way \$11.55 8 T'424 \$39.50, way; \$21.55 9 S4 \$5 one way at two way feet Valves \$18 one way or two way where her

SUPER SPECIAL - WEED SPRAY OUTFITS

Factory closeoull
World's Egest six pleas
steel 7 com 13 acaze
2 ft outfit (ample a
with plants push but with purp push hur on select of take hose Money back Kuar SATE Money back Busy prod \$129.50

HAND WINCHES-HOISTS

100012 = .nch \$15 95 200012 = .nch \$25 95 Chain held cever (the ph b \$10.48 (the ph b \$10.48 1700 PH 5 519-48





### SUPER CLOSEOUT BARGAINS

© City Phones 54 98, Rural Phones 513.80 © Air Power Grease Ques , 900 523 88 © Gas Chain Baw 34 In ) \$258 50 © Electric Drill 19 Jacoba chuck \$29 95 Precision Hand Level \$5.95
 10 k18" Air Tank for compressors \$5.95

We pay shipping of arges, Sour for cala og

BURDEN SALES COMPANY #28 "U" ST.

### A CRAFTSMAN'S GIFT for FATHER'S DAY!



window valances knick-knacks, hobby projects etc. High speed. reciprocatinglype motor easily cuts as-phait and rubber the also musonite and formica wood up to 4, Perfec Perfectly sate for children so easy to handle that women love Has only Iwo to the H mot ng parts never needs oll na A high quadty tool t sed by craftsmen tile tay-

Cuts errolls like magle! ers and carpenters THE YOUR DEALER! If he can't supply under lired on five day trial, money-back guarantee Bendt to ! if for you tell a sument or good \$2 now pay postment balance plus postme and ! O II

making

work.

DREMEL MFG. CO. Dept. 123-F, Racine, Wis.



A "Stanley Tool Guide shows tore and use of took for all woodworking jobs plus diagrams of wood rounts and cuts, tharts on mutal working Over 200 Illustrations Send 25t today to Stanley Tools, 463A Elm Street, New Beltwen, Connecticut.



For over 100 years makers of fine tools, fishing rads, gelf shafts 272 POPULAR SCIENCE





### DRAINS Celiars, Laundry Tubs; EIRCULATES Oil; IRRIGATES Gardons

Briginal "Type P" Pump has 2600 GPH ospacity 360 GPH 13 high or 1500 GPH from 25 well Dise any 15 to 12 HP meter DGES NOT CLOG See Papular Science, August, Page 100 Only 36 95 posspand if cash with or \$ 495 der (West of Mississippi, and 50c.) \$ 495

U MONEY BACK GLAHANTHE the same to the state of the same of

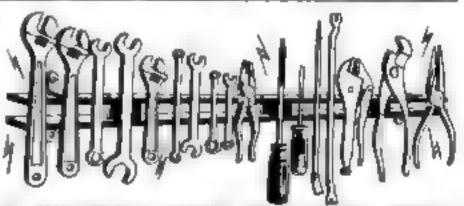
Motorcespismy Lagradus. LABAWCO PUMPS, BELLE MEAD 3, N. J



### BRONZE FOUNDRY

Schools and Home Workshops Make your town that has of alund nur, copper, bronze aliver. Foundry sels are available in three sizes in-cluding 2 too Deg. F. blast Furances, #22.50. #28.50° and #42.00 f.g.b. Kansas City Free Circular

P. O. BOX 6022, Oapt. 5-6 KANSAS CITY SPECIALTIES CO. RANGAS CITY, MC



The TOOLMASTER A permanent magnetic look rack designed to hold your two s with a convenient reach flequies no earliesty. No cost to operate Never weakers Simply touch he tools to the TOOLMASTER and the powerful Ainten magnets hold them there before your eyes at your fingert ps. Select the too you need quick by without loss of time can y removed Constructed for many years of constant use For nilestrial plants made he shops garages home work shops, sie Order now if after one work a trial you are not completely sailafied return it to us and we will promptly be-

Fund full purchase price

Cat No S 103 TOOLMASTER" 36" long \$12 76 ca

Cat No S 143 TOOLMASTER" 24" long \$ 8 98 ca Complete with mounting brackets and accesse Send money under or check We pay postage on C U D a MIAMI MAGNET COMPANY, 3340 N.W 27th Ave., Miami 43, Fig.

Says Clay Smith, top U. S. Racing Engine Specialist GET SUPER POWER with WATER ALCOHOL INJECTION!

Your car can't give its best on the low-octane gas now sold, but auto enginters agree that the extru cooling of water alcohol inside the cylinders prevents overheating, detonation and power loss —boosts horsepower speed, and gas mileage! The precision 1953 Octa-Gane Injector not only blends inner cooler with the fuel vapor, but regulates the amount according to engine requirements, moder all conditions. Burns up to 1 gal. of water or water-accohol mix per 10 gals, of gas. Over 150,000 musified averal

#### OCTA-GANE SAVES MOTOR \$8555

1. Use regular gas an high compression engines safely.

Use bigher compression-get greater power on premium gas.

Gain fuel mileage-increases up to 30%. Emminate detonation and overheating-save engine damage risk.

Arrest carbon formation-increase valve and spark plug life.

The 1953 Octa-Gane, only att-bronze, exhaust operated injector on the market, features micro-finished plunger with needle type melering and spring loaded valver and is fully guaranteed for 90 days. Easily installed on any car, truck or tractor. Price, complete with 11/2 gatton corrosion proof tank, all necessary brackets, lines, fittings, and full instruc-tions, only \$27,45 (Dual manifold kit \$1.85 extra), Shipped postpaid, or send \$5.00 deposit, belance COD, Calif. buyers, please include 3% rales tax.



FOULOW THESE

EXPERIS ADVICES Clay am in typer of Indian

apitis winners. I use Octa-

we and on the cau-

premium aline

trane for top efficiency in

Matter Trend research Bet

ter petermanes un Octa trane and regular gas than

son be increared up to sone with alculius water gas

DEALERS: Write on your letterhood for complete information,

ENGINE PRODUCTS MFG. CO. 5861 C. Beverty Bird., Dept. 31

Les Augeles 22, California

r	ENGINE PRODUCTS MFG. CO.
1	3841 E. Bererly Bird. Dept. 31
1	Los Angrios 22, California
ı	Pirace ship 1952 Octa Gabe for Yr
ı	Name
ı	MARKET
1	Econ Hare
-	Check Enclosed   Deposit Enclosed



Corbon Pr & GENERATOR VOLTAGE REGULATOR recommender for the lett and R I the generator in build your away Light \$4.00

WEAVER HYBRAULIC HAND PUMP Fluid Rated 29am \$9.95

GEARS BANG IN SPEED BE are pred able to the 2 mountains INSECT C DEPUMPSPRATERANDFIRE

Extinguismen | hear go no ease or mire appet a 3 ft of high pressure bone with fine miret being a lived great court on but I in give years of himse duty \$2.50 10 30 erryler. WI 15 THE

CUNO OIL FILTER-Brand New A comfa spe havers of a doubt car es de fritario a c'esta Stangaro, anti regio des a c'esta la al uremonate ntet anti uni et possa la al uremonate de fina bet in cute STAN 31 5 No. O.L Instruct ons \$4.95 per 1

ELECTRIC MOTORS

W. Ma. 496P Lt. No. M.P. 24 V. D.C. 2000
M. Mrg. by Prevo. applicable for 319 V.
Instructions Incl. Page 67 05 R P ECLIPSIC HOYON & GLAN UNIT

Brand New Beltstein 218 M mean ratio 41 an be admited for to 1 a 2011 treat (1989) F THOM OF

in I a St. I heat of the S THERM OF S ER SI SIST OF SPECIAL STATE INT. THAT THAT SANK STATES IN STATES IN

PESCO OIL HYDRAULIC PUMP LICEL T pe the Presence bears duty pump the ed 2.

Her loss to of her less the Reserve to the less than the rection he mist nod so let posts that it may be a fine to the less than the state of the less than the state of the less to the less than the l

\$12.95 PESTO PUMP Inc. and built in motor if I Appr we fur 345 ( % ) to achter of hises, P d L note the bounter of the bour ron or in Kater ron to Level requests for Level 400 L. P. H. Lovellesson tori Love L. cost 39.95

FOR WHEN OIL INSCRICTOR STEEL IN IN accept the to ret of and by past to the accept the to P H is do respond what he prove in et and out a fin provent de a lact 57.95

DOS ON F...

D. C. GEMERATOR. P and new Name of the party bearing, Sar only Send CHECK OR M. ORDER PRICES F.O.B. KCMO EXCEPT when marked POSTPARD U.S.A.

Stratopower Constant Displacement Pump

by operating hydratic excloses, but describe the frequency of tenders, but describe the first on tenders, but describe the feet or all transfer, electrical For feet or all transfer, electrical describes and the CFT1 at 250 kg 2 M Rubel 1250 to 1400 F.M.1, 2 M to the X F M HAN RI HIT 18 in to the X F M HAN RI HIT 18 in the Annual State of the An

Stock No. 12 Nydrauste Cylinder Double Ac1100 mar an 1250n ha with 1000 P 9 1 hand
1100 mar an 1250n ha with 1000 P 9 1 hand
1100 mar an 1250n ha with 1000 P 9 1 hand
1100 martin no 100 2 hereby, 1 3 16 die, Shaft,
12 hand 100 2 hereby, 1 3 16 die, Shaft,
12 hand 100 2 hereby, 1 3 16 die, Shaft,
12 hand 14 hand 14

STORAULIC PRESDURE & Relief Valve & \$4,95 PHILE porte. Adjustable up to 2000

Mydrontic Selennid Control Volve BEREADA MO 0.3560. For remote content operation and a operate one and a rest of an are double as on h denute sy indeed with 24 V Is a well to 2300 P S I Connections are 15thd. App topics for lab V A a Indicar tiens and data in \$3,50 es

GENERAL SALVAGE CO., 2922 E. 27 St., Dept. 163

Konsus City, Ma.

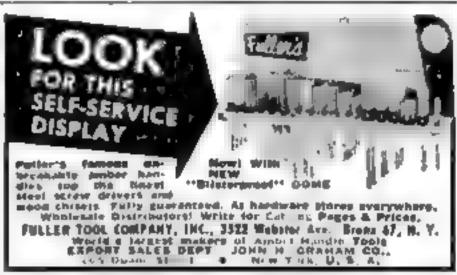


- snow-white blade with bold legible, jet-black numerals and graduateons. Graduated in 32nds for first 6 inches.
- sturdy die-cast case heavily chrome-plated, calibrated for quick reading inside and outside measurements.
- blade %" wide made of finest high carbon steel -tempered
   Bonderized -enamelled-baked
- blade replaceable in seconds without tools without even opening case. And Evans replacement blades cost for less.
- · every Evans "White-Tape" a unconditionally guaranteed.
- exclusive Evans automatic brake gives smoother push-pull action with absolutely no "creeping" of tage into case.
- underside is white, too Mark with ordinary pencil, remove mark with flick of thromb
- unheard-of low price\*: 10-ft. \$1.49; 8-ft. \$1.19, 6-ft. 98¢.
   Prices higher in far west and Canada.

Evans a co Elizabeth, N. J., Meetreal, Que. e ....











### GOLD-SILVER-COINS

Easily located with new Lightweight M Scope Detector Superior performance, lowest price, monthly payment plan

PREE LITERATURE

PISHER RESEARCH LAB., INC.

### **Explore the MICRO-JUNGLE!**



Triple-turret microscopes as low as . . . \$9.95 New Quadruple-turret models(as show) \$16.95

All slide materials Other optics from \$1 Send postcard.

FREE 44-PAGE

CATALOGI

World's greatest values in quality microscopes, teles scopes, beneralars All holds and professional mode a



##AKROD!

32 Akron Bldg., 4400 Sunset Blvd. Los Angeles 27 California



# 6-Year Guarantee

Seched by \$75,000 Incorporate

No other hattery produced today—or probably for many years to come—dares to make this guarantee. Every Lifetime Battery must pain rigid tests for peak power, endurance and automatic re-charging before it even leaves the factory. Guaranteed to give 100% satisfactory services for 6 years. (Special guarantees available for commercial, Industrial and farm use).

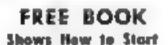
### of 160 and long and after all 160 are 160 are Show me how to make \$20 to 🖥 \$30 extra money each week

FOLEY MFG. CO. Send FREE BOOK-"Money Making Facts,"

Name....

### Send Coupon today

and everything elect just think what you could do with extra money every week Turn your stare lime ate (ASH sharpon og saws with a Foley Automatic Saw F fer pays up to \$3 or \$4 an hour Start With the high prices of food whoth me In your hasement or garage no experi The first new I sharpence necessary The first saw I sharp-encel with my Fore Filer came out I they " wet on Leacence & Parsons No. convene by I Advert sed in use local paper and got a Dil sawa' saya M L. Thompson With a Foley you can file all hand saws also bond and cross-cut cirgular saws



It explains how you can pres biprofilere Propir la me U-WEIGHT ! Britisers curponter- -chiero fas o es-I got work from 2.1 mg ptr mint the miles away pays Charge II South Prop Book Money Mak Ing Faces 1021s how to arget Send con puts toda no asternian wit cal.





be left on the job for any work man to use. Cannot be put put. filled with seriet Fig Liquid, mount. of indivisionent and expensively my brockets, and metal case. the most cornal handling ets principle is so simple anyone con level points quickly and accurately

For footings, forms, batter boords, sills, lintels floors, cedings, roads, driveways, lawns, piping, form contouring and all general construction work normally needing on expensive insteument.

L at excentered to Liquid shipped with Delaze Madel aniv.

quality would polechloride tabing

advitable, 61 C. Wydney for Paralage Stema March 1910 75 Betwee Louisier 15, 86 Mail no - 50 Sentall featurepers in \$ 1.95. you describe antistection or means book with refere of Greenell within the Book.

te At and

Town from

Seri COD Coul per prompt had purhere price plus do nely plange on an Fall per have press to exclused. Sand P1 00 ff Parkage proposal no police in

Easy way to strip paint . . .

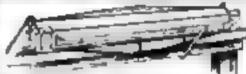


softens up the toughest paint, varnish enamel or shellac. Comes off clean at every stroke of your putty knife. At paint and hardware stores,

Write for leaflet and advice on your removing problem Wilson-Importal Company, 121 Chestnut Street, Newart S. H. J.

### EET · METAL · BR

Protaburgh Battfes locat 24 6 sivel bearing a u-Cam lucking mount on bench truck or floor mand Trues braced size! Express collect 10" 42 be \$28.30



Trues indiced alicel Express

collect 10° 62 be 828 30

38° 75 be 834 be 40° 100

in a 18 be 18 be 10° formable stands. 33° 80 50 for 87 00

in a 18 be 18 b

12 PRESS BRANK Fe any deld pross Open \$9.50 and Jums compound beints post paid \$9.50 (immediate delinery Order direct, each or C O.D., or send

VYRE BRAKE CO., 5-3016 Leavenworth, Omeka 5, Nehr.

### FROM AIRCRAFT BUILD

**YOUR** 

*ARC* • WELDER GENERATOR For Light or Honry Work

We able him he to be let be he he he he property without property and property of the property of the head of the has after them in out of Comporte

4 77 Sent College War Surjeton and LEJAY MFG. CO., 1223 Lajay Bids . Minneapelis S. Minn.





Sharpens round shank drills from J 32" to 1/2" in diameter, up to disong Grinds old drills like new in one Grinds old drills like new in 4 different point angles, using hand or somer granding wheels. \$2.95 Money back guarantes, only

A.D McBURNEY 217 C. 416 St. Dept. B.30. Los Angeles 12, California

### CATALOG OF GOVERNMENT SURPLUS



" POLISH . BUFF . SAND File All E ectric Drills-Kit Contam 5 Polishing Bonnel Seven 5 Sanding Discs Rubber Back ing Ped. 3 Pc. Arbor AND the

All on Individual 1/2 Shants Wire Brush, Felt Bob Grinding Wheel Sending Certridge Regulary \$5.00

WRAPLOCK IMI USES 2,49 HATEL

The Mest Efficient All Perpose Clamp Ever Made - Will Conform to Any Shape and Try Anything That Can By Tred with a Ciamp.



Complete with Strapping Buchles Cotter Fins Keys, Retchet Wrench - Cavit Surplus

12 BIG STEEL In Rattic Stand with Cover Standard Shouls, Rep \$4.00 3/32"

utal Specialty & Sales Co., Bept. 1759 P.D. Box 672, Great Heck, H.Y.

### IMING EQUIPMENT



plande of two desires business arth pairte transference Residenced. and paratrulation tions strap. Vertail for all 4 drainage, Ideal for dis-

ing E swimming. Available in man's, 595 contained attitions are no



DIVING MASK

A fine quality mails, blan dur glighhas writer alone drawn a serious manage Saft you subtur with sharp given love and adjustuals used band. L. Prompti & naturalists, Cares.

7.259 mr 269 m 395

In carry a complete from all Substancing, Diving and y service y proper production. He shall are your emperorance to



#### AMEN'SELP CONTAINED DIVING UNIT

Fried and brighting and bandon of Print west under meter. This part has a salingerated, replayingly requires as eafer value. The 410 cm in constants all sit of male allows up to - 2 hour under water. Hee perfected mouthplace 2 Hos femas to regulator 8 femmanaged barrees, Warded U. S. Pavy populations.

### ARBALATE' SPEAR GUN

Kast afficient underweise que madel Pavartus accarate is foot. Lars i grassbook prior ato, Rushie property blog unforp greek & will flage greet against is relatively. Curt be in midel under 2495 water, Journal Fange to 14 feets of a 12-2495

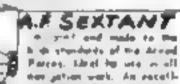
SMORKLE BREATHING TURES - Printer with rubber mostlepeach. A lower freething with face under water, CURVED TYPE - No -



### B-12 MAGNETIC CA



A HA WAR STRPLUS BARCAINS WIL to no homework femoracy over brechest Army Asserted their is extended one pr empe ting, cubirered in 1 degree incomments from C to MC Two pare. that god was a fee hit is greated, head for airphose, beat, etc.



ged depleyment for the product men ground guid and L glid Forward, bubble level type, Cue is usual ace Apple

### MOUS

WAR SURPLUS MIX. Flow hand books an dany Strap for heapture or harbone. Tools clone are week by now it in au price but up those in the Scoop FREE

inefolia is training Parieti. Ch. salisticining, Stoka Potent and 17" Stanley Screwdinger. A. hiera crucinia cast steel hands and hordwood hardless for 289

#### NERO SEAL MOSE CLAMP MIX



Another Polley Bergers Mrs. 24 months have clarge of war love brane & repair, blend for 800 we water. Trucks, Tractory, boots, plates, pouce are all of the to Property 295 979

FILE MAR ... 10 reserved Filter, 4 inch to 12 inch. This was Visons, Holf Bounds, Mills, Bostowis, etc. in seconds and used her good medition. One 99% Vision share a watch may be a figure or only

BADBET MEXICANAMOR SUPPLUS BARGAINT Includes Rivers, Smerry, Betts, Servers, Wheel Bertings, Surings and Clares, Seconds for ONLY . . .

TERMS

DROFF FROM THIS AD Pin by M.O. or Charle P (To opension from well report D & B farms, 50% report required with all C O Distable prices

### KAPOK FALLED MU

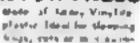
the BARGARI ban Palayal F. had with 2", provide of 100% KAPOK. Has welningpolitical human claffs come and forms. Every to puch. haughy and all these Turk are in 36, by 90" Her 1 & length

### tipper crears. You Illused our of many SPECIAL SLEEPING BAG

Covered in special, or a pressur through Clark which shade water and regal doply Land with places, or the cohean. Final with the of 100% WOODL, Her double built separat down scale and nergy a hardigan by form good double-up the short two are

august Ingother, then has an instrume parties, Larg newHop has two by Him puchats, Fish ships 100 + 61 + 70 Weight 7-1 7 paints 2/50

### AIR MATTRESS



25 + 77 A \$700-1. One V 59

### BRITISH ARMY PAGK RAGK

Port Conten Has off steel bone onto command, feed-

as bottom page shalf as All already are make or Brother Deal and

- non-of-radius; and society is asset, Astributed. Strap across tenur section acts to absent about and sway. Folds for your 3-1 7 populate

#### RUBBER BOATS -Cares



aiodo to Confr apazifications. labor for use to fearer, comes, er ocean. Just the book for the Enhancement of Surface, Surface phonospie pass to puch Tor

7 HAH 4995

#### PAROLES 5944 ARPENIE 395 WESTMISHOUSE COMPRESSOR

#### president to the appropriate inflations. air teals. Used in garages, was s, aboratories can mucha, fractura, pages, are. Will our set fan hy-e ye

remon trabation?". Operators as 1/2 MP, Gas at Electric tester Runs in entire Experience Delivers engrave 3 2"CFst. et 400 FPM or 6.54 FFM or 1200 RPM. Hea 2" form, 5. 2" strate, Automotic clutch. Stan Width W. Sought 12-7 RT dayth 5-3 4% Assertation registr 22 Feb. 100 februs waters, rocks and fittings to steep a till

### 230 PAGE CATALOG

HAMP's of ETERNAL PURE MAINTENANTED FOR the MACHANIC SPORTSMAN, HOBSTET. HOME OWNER, Mr.

For Surplus ... Foctory Clements and General Marchandton Vollage) Same on Hurdware, Hand and Person Tools, Godpots, Sports, Springwood, Hyd-PRODUCE NO. SEND 254 FOR MANDLING & MANDRIS.

### FIRE EXTINGUISHER

#### (DECONTAMINATING M2)

You'll want they all-purpose, hand person, springing and the free of many Fire Extinguister, no insect spray, perdon & harhouse spray document etation, name of tragation, foodmy plants, stc. Will about a forgafull attraign operate 25 fault at a progr a soft, dawly migh, he might outstruction with hundy ruck. Fan by f flee & sporeted, Another Amening Policy Bargaset 💊

shoulby the NAYY for Fight Duck and Gun Cantelli. An Ideal overgoncy contiquicerist system bedonts such set in ers percent - no other percen

supply moded. Parlest for affice de-shop into contemporage or horse at the particle-part within the end-up of 3 m to. Each set secluses for photos so chestplates, too bondarts, button pulliches and appear makely of ware, A Transactions Buy 925

#### One Phone and tendent

2-WAY PHONES lauruit stay apt of dock phases. das partiact tour-upy comment a period from my hot paints up to 100 four sport. This band

same not to lividing to blue, habed anonal. ten two phones, why and simple hash-up instructions. Operates at artisonry First phi bertures from a se ideal ser far use retroited reno house-la-yerage or born, derbraamiteexecisis, office-to-office or along - to A Time & Sec.

### RADIO BARGAIN:

Provide Talophone Type, Highly sensilves time aucellant, clear tone. Was the Signal Corps feverite, An ideal Instrument for the Hadle "Ham? and the Briefe's everal recording physics, for broad-Costing, home recenting, public address. pystems, att. All to-met 🔏 complete with nord & plug-

#### USAF THROAT MICROPHONE

Genuse USAP type T-30-0. Gives clear, distinct veins exprediction by swarsh or the

envirous brought autor. Set can prote of two encouphases, maintail an exister nestinage while furthered to elected nach hand. Operators between 100 on 1 Will obe a

### NEW RADIO SPEAKERS

Ideal for small realizes, wherever explaint, feel equipment, and

ALIGOD - Personnel respect \*\*\* 4" dan 7 was bank up. 249 STRAMIC SPEAKER - 10" with plup-in and it also on A popular mode for one

radio sura, TV recovers and partitle a offic Address systems, this full term Street of the Bours.

### SURPLUS TANKSCO

A very counter, transparation tales score. End to sighted with formed [ Face place. All from construction .... FULL 20 POYER manifest



### MARK W DRIFT SIGHT

Originally designed for earlief nevigories. Conter used in single power releasing Contains many valuable present, breast, etc. Recording mount has up the mount parter, need to have their, warm year ting your, stylus, shoostel & when Howe of volume have to a great rate testimanent of interest to the leventury experimenter, astiserier, student, unigeteer & highlight. The springlipping alone are worth title. Ad QC then my special Gergele Price.

PALLEY SUPPLY CO. Bust PS-6, 2000 0 Versus Acr., Inc Angeles St. California

### Answers to "What Airliner Are You Boarding?" Quiz on Page 104.



1. Douglas DC-3



2. Lockheed Super Constellation



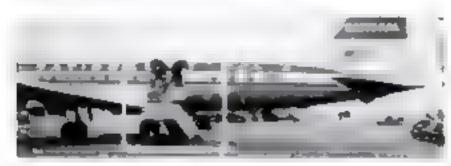
3. Convair-Liner



4. Douglas DC-4



5. Booing Stratocruiser



6. Douglas DC-6



7. Martin 4-0-4
271 POPULAR SCIENCE

### This Little Car Has Big Ideas

[Continued from page 92]

makes its contribution. Each wheel is insensitive to the movement of other wheels. Adding to a smooth ride is the fact that the front suspension arms face forward and the rear suspension arms face rearward, with their pivoting points close to the center of the frame. Thus, since upward thrust of both front and back wheels as they but a bump is near the center, there is no bucking—the car remains level. And there are no axles in the true sense. The individual drive axles to each wheel carry no weight, only torque to the wheels.

Combined with this suspension is a spring system that takes only the dead weight of the vehicle—and has a full eight inches of vertical travel before hitting bottom. The springs do not have to absorb twisting, side shock and torsion as in ordinary cars.

### New Seat Smooths Ride

Then there is the No-spin differential. This is a complex gearing arrangement that gives traction where it is needed. If a wheel loses traction, it doesn't spin faster, using power to no purpose. Even if three wheels lose traction, all engine power is transmitted to the fourth wheel.

As for the smooth ride, a lot of credit for that goes to a new type of seat called Flotation Motion. The bottom and back are all one spring—they give as one unit, with the back taking up 30 percent of the body weight

Another feature, now being tested by the Marines, is a flotation kit. This consists of a rubber bladder that fits around the vehicle and is inflated from the exhaust. Lightweight paddles are attached to the rear wheels. And the Mighty Mite is a motorboat.

### Change for the Better

Farmer: "Well, Maggie, now that we've struck oil I want you to have some decent clothes." Maggie: "Nothin' doin'. I've worn decent clothes all my life—I'm gonna dress like other women now."—Wireca Life.

LPWS-G4Y-Y08Q



BELF-PROPELLED It's a relary mover it's a power sichle inter contract It's a cultivator Traction **Bhews** with. 20" Betary Mewer Attanto ment (Etem dog)

Where cise can you get a power tool that does so many jebe? Works for you sear 'rosand, Does terrifle lad culting grass or weeds. Or, prepares meriowed deep seed hot without taker, Built-le power takes for the drive pumpe, made, generators, etc. Safety clutch—can't berned. More versatile and efficient than tractors cooling twice as much. Converts in minetes to Tiller, Power night, etc. Basic self-propelled 2 by tracing with Briggs or Citaton femans \$113.50 biology Laws Mower \$42.50 Laws Mower Hitch. \$42.50 Laws Mower Hitch. \$45.50 Cultivator \$75 Dies Harraw \$75 Dies H

Cany payment plan available.

### NEW MOTOR BIKE

Our Caronando Mater Dike to trouble-freecarries smaaing 5 in 150 miles per gat, on all roads. Speed

roads. Speed to 60 man. No all of man. No all of man. No all of paor fermes. Been actionally perfectly of retarminity francrission. No helia or chains—power transmitted directly to real wheel. Accelerates quickly. Complete motor and hit ready to attach to your like in 1 kmay. Get free 12.00 Complete Meter Price. 12.00 Complete Meter and Chanaia.

### Variable Speed Selector



Heavy duty, made by B. F. 6008-RICH for indus-FICH for industrist use. Provides (natant
speed chances
for any drive,
For machine
tools, dryers,
pristing, conveyors, production lines, hoists
— any operation
requiring variable speed lives
for midget autos. Employs
reliable "trouble free" planetary system. No
power losses or
plinite range, amouth

667 

3-Pe. ARRESTABLE WHEREN SET



Made of finest German Tool Steel. Completely drup forged. Pipe sizes clearly marked for easy leavy sharp jaws will never alip. Ideal for master craftsmen. Set includes R"-10" and 14" wrenches. Covers anset pipe sizes. A completely of the control of brute strength precision workmanship. Will for themselves on one job. 

### BUY FACTORY DIRECT

SAVE MIDDLEMAN PROFITS

#### GUARANTEED LIGHT PLANTS WORLD'S



PORTABLE LIGHT PLANTS

PUSH BUTTON START A.C. PLANT Inc. To warts—till v.

—80 cyc. A.C. Powered by a regged 2 hs, ensy-starting

Briggs gas engine. No wiring necessary, just plag in and
aperate. Plenty of current for any sill burner, freezer, brunder, emergency lights, stc. which require up to 700 watts.
Ideal for Civil Defense, Fire Depts., trailers and samps.
Complete with Voltzseter and built-in wholing to charge 6 v.
auto bulleries. Here 31 Wt. & line. Be prepared if wer seplores inseeks out power lines.

Reg. 4215 value.

700-800 Watt Plant (Here 44)
pome as Here 24 but larger cagino.

\$169.55

asme as Here 24 but larger generator & cagins.

\$199.50

Hartin-Life 2500 Watt Plant (Isem 21)

11s /15s v. 6s eye. AC. A newerful plant, regardly sensitivated and yet designed for easy pertability. Can be started by rape or built in 12 v. electric push button starter. Built in winding to charge lastery. Powered by a big 5.10 HP Briggs engine. complete with all expenses in Excludes courted but, welfunders and handy ping-in permanent or stand-by service. Wt. 225 io. \$329.50

Regular price billion. Fartery price.

11s /12s v. At. beit driven so insteading may ensity be utilized for other parposes. Powered by a rape start.

5 f6' engine at. 230 lbs. Megaliar lbs.

10sh. Fartery price.

11s /12s v. At. beit driven in instead price start.

5 f6' engine at. 230 lbs. Megaliar lbs.

12sh. Fartery price.

13sh. So. Fartery price.

14sh. Soc. Fartery by a rape start.

5 f6' engine at. 230 lbs. Megaliar lbs.

15sh. Soc. Fartery price.

15sh. Soc. Fartery by 11sh. Soc. Fartery with win. Ragime. Feeth button start. Wt. 37s its. Resery doil.

15sh. Soc. Fartery by the button start. Wt. 37s its. Resery doil.

15sh. Soc. Fartery by the button start. Wt. 11s ibs. (Item 1864) \$238.50

2000-3800 Watt Plant (Item 21) lbs. Factory lyter 2878.50

2000-3800 Watt Plant (Item 21) lbs. Factory lyter 2878.50

2000-3800 Watt Plant (Item 21) lbs. Factory lyter 2878.50

2000-3800 Watt Plant (Item 21) lbs. Factory lyter 2878.50

2000-3800 Watt Plant (Item 21) lbs. Factory lyter 2878.50

2000-3800 Watt Plant (Item 21) lbs. Factory lyter 2878.50

2000-3800 Watt Plant (Item 21) lbs. Factory lyter 2878.50

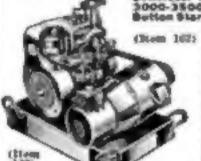
2000-3800 Watt Plant (Item 21) lbs. Factory lyter 2878.50

2000-3800 Watt Plant (Item 21) lbs. Factory lyter 2878.50

2000-3800 Watt Plant (Item 21) lbs. Factory lyter 2878.50

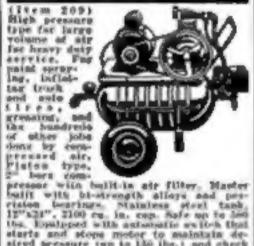
2000-3800 Watt Plant liter at the local part of the liter 200 lbs. Factory lyter 2878.50

2000-3800 Watt Plant liter 2000-200 Watt Plant liter 20



Since the series of the series

### MASTER AIR COMPRESSOR

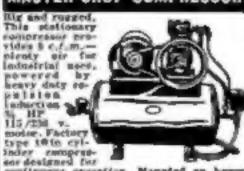


starts and stops motor to maintain de-steed pressure up to 120 the t and stock starts and stops meter to maintain enstarts pressure up in 120 lbs.; and shork
valve, safety valve, gauge, shat-off
valve, 28 ft, olr hose and thre chuck,
Segmitfally balanced as ball lugging
wheels and rather thes. Low factor
prices, with by he, 110 v. A.C. matur
(Ken. \$275.00)
(11cm 209)

\$98.50

With his hp. motor, Reg. \$119.50 \$120.50, citeen 200A; \$119.50 With I kp. Briggs Gos Engine, they, \$100.50 

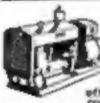
#### MASTER SHOP COMPRESSOR



continuous operation. Mounted on heavy 20 yal, steel tank. Complete with an-20 yal, steel tank. Complete with macelled valve, check unive gauge, shut-off valve, and 20 ft. heavy duty ale base. niout-aff #319.50, factory price. \$189.50

Prices f.o.b. factory. 10 day Money back guarantee.

### DIESEL LIGHT PLANT



(Item 1660) Diesel Master-11-12 hv. 115 (230 V. A.C. 115 230 V. A.C. aingle or 5 phase. 1800 rpm, direct connected, Designed and engineered permanent prowers
Installations. Assures
officient, dependants low
cost operation where
is important. Wt. 1350

heavy current is important. Wt. 1350 Rm. Regular list 83,850.00. Facury price \$1895.00 10-11 tw. 645 BRIVEN PLANT, 115-230 V. 66 syrie A.C. powered by 4 sylleder Winnessin air cooled engine. ted services by the literal 162 but much r. Here 217 wt. C1245 00 pence. S1245.00

### HEAVY DUTY D-C



webler, Up model, blade for years of translating, will

strike and hold, because of specially designed are stabilizer. Hills a lir cooling system, at the and hold, because of specially designed are stabilizer. Hills switch and dial control gives wide range of welding beats. Bun welder at 2600 rpsm, with tractor, jeep or 15 hp. cas engine, or 7 hp. elec. motor. Complete with instructions, guar, and 

### Write for prices on A.C. Are Welders. Factory Prices on Catalog Items

Send 10c for 850 1953 catalog, Hundreds of bargains

### **EXTENSION CORD**



lated S 214 I conductor

moderately flexible and joint discrete frequent rolling is not required, Resists oil, grease ar water. Use indicers are out. Complete with heavy rather plug and suffet. St., The., \$1.35 (here 16) 66 ft., 2t., The., \$1.35 (here 16) 66 ft., 2t., The., \$1.45 NEOPRENE EXTENSION COMP.

Z16, Z conductor stranded wire, extremely flyxible, ideal for hedge trimmers, laws mawers, power tools, etc. Twoch and rugged, withstands any stools. Complete with rusiber plug and cullet. 40ft, (Item 16a) wt. 315 its, rec. \$2.49 starty \$4.85, SPECIAL...\$2.49 

#### 32 Pc. SOCKET SET



Highest quality guar, man-breakship sechets made by Hushy,
Beauliful, snatched chrome alloy, sheolutely the least, Complete range of 21 sockets from
1a "thru 7/10" in 1a" drive and
7/16" thru 1-1/12" is 1a"
drive; 2 extensions, reversible
1a, "ratchet, adaptor bit, slide
best, all argie coupling, 2 end
wrenches, by specier bandle
and sturdy metal tool hos. For
prof. mechanics who wast the
lost, W., 14 lbs. (Hern 55)
Lasily worth
541.50

37 Pc, SOCKEY SH

(Cossists of above described set,
tott includes a bip definese tool
has with sample resen for other
tools plue a a pc, hi-chrome alloy
consistantian wreach set, Easily
worth bay, 56.
(Item 560)

48 Pc. SOCKEY SET

(Item 20.5) Contains a complete
set of sackets in 1a," frive, 3a,"
drive and 1a," drive, plus 51
nervessary extensions, handles,
specialers, reversible ratchets,
ste.; all uncond, guaranteed
avained broaden bin wall sle
loy cockets in a stordy bandsquise steel tool box, Wt, 17 lbs.
List price \$12.20.

Factory Special. . \$26.95

#### VENTILATING FAN

(2tem 10; Mount In wall or coiling to ventilate any arra. Over range, remove hitches scote and odors. Easily installed in furnace pipes. Furnes even heat to all rooms, l'ov-



forces to all recents, Powreist suntimposed
outh motor, 110120 v. A.C. testel, super effects of
ian source bage velocity of air (400
to 800 c.f. es.) F. Fan., wt. 5 lbs.,
be.35; F. Fan., wt. 6 lbs., \$7.55;
io. Fan., wt., i lbs., \$8.85; id.

F. Fan., wt., i lbs., \$8.85; id.

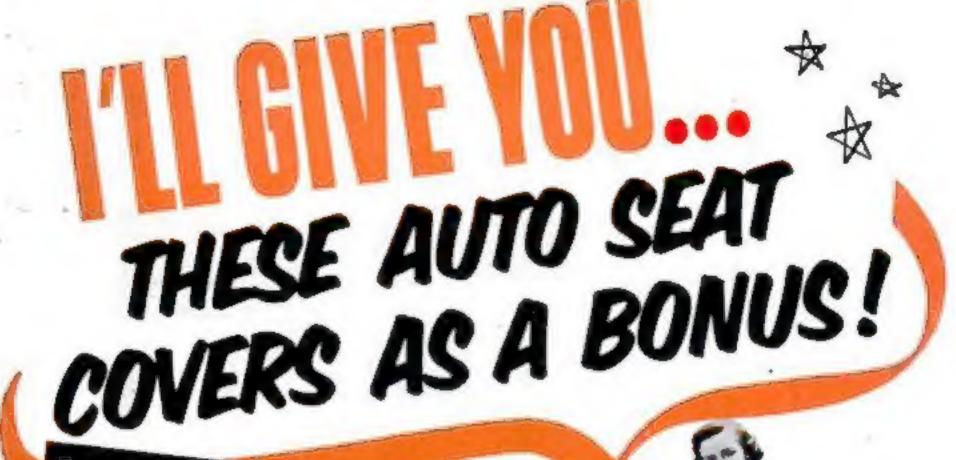
10° Fan, wt. 7 Hos. \$8.851 kl Fan, wt. 7 Hos. \$8.851 kl Fan, wt. 7 Hos. \$8.85. HEAVY BUTY FAN. Sami-enclosed restor, suitable for sgray booths, restourant exhausts, positive bouses, etc. 10° Fan, wt. 8 Hos. Reen 10E \$45.95. 22° Fan, wt. 10 Hos. Reen 10E

#### HYDRAULIC JACKS



Heavy duty, precision issilt, onesoth, positive action with issilt-in relief valve. Hitalit with nerow extensions. Gert, surplus at a fraction of orig. cant. (Mandle Included.) 3 ton (Item 200A) \$2.45 % ton (Item 200B) Wt. \$11.45

Send check or Money Order MASTER MECHANIC MFG. CO., DEPT. 61-C Burlington, Wis.



X

And pay you well besides if you will show them and take orders from car owners in spare time only!

Just 1 sale a day can pay you up to \$16.50 daily in profits!

It's no trick at all to make entra money day after day when you can offer car owners America's greatest seat cover values . . . and a choice of patterns, styles and materials that will fit their car such as no one else in your territory could possibly offer! Free Sample Outfit that fits into your pocket . . . complete with swatches of the gorgeous new materials . . . will start you taking orders at once. No one can compete with you in wide choice, in quality -and in expert tailoring that makes covers fit like a pair of gloves. And when you quote the low direct prices that are only a fraction of what the customer expects to pay you'll find you can make money hand over fiat writing up the fast orders! Line includes nationally advertised sensations like BLACK EBONY Saran, in the new Black and Bilver Watermelon Stripe. beautiful beyond description BAM-BOO, luxurious, brilliant FIESTA. colorial BULLFIGHTER PLAIDS. plus many other exclusive patterns to choose from, all at unbelievably low prices. It's no trick at all to

make big money, whether
you sell full time or just
in spare time. OPPORTUNITY TO
SELL AT WHOLESALE TO GARAGES, BERVICE STATIONS,
ETC.

\$45.00 SET OF COVERS

For Own Use

GIVEN AS BONUS

GIVE MAKE, YEAR AND MODEL OF YOUR CAR. No experience needed. Make all the extra money you need easily just by showing! Every car owner a "hot" prospect. YEAR AROUND STEADY PROFITS. No investment to make. Actual seat covers given to producers for OWN use! Write for Free Selling Kit and actual samples TODAY!

KEY PRODUCTS CORP., 800 N. Clark St., Dept. 636, Chicago, 10, IN.

### RUSH NAME FOR FREE OUTFIT!

KEY PRODUCTS CORP., Dept. 636 800 N. Clark St., Chicago 10, III.

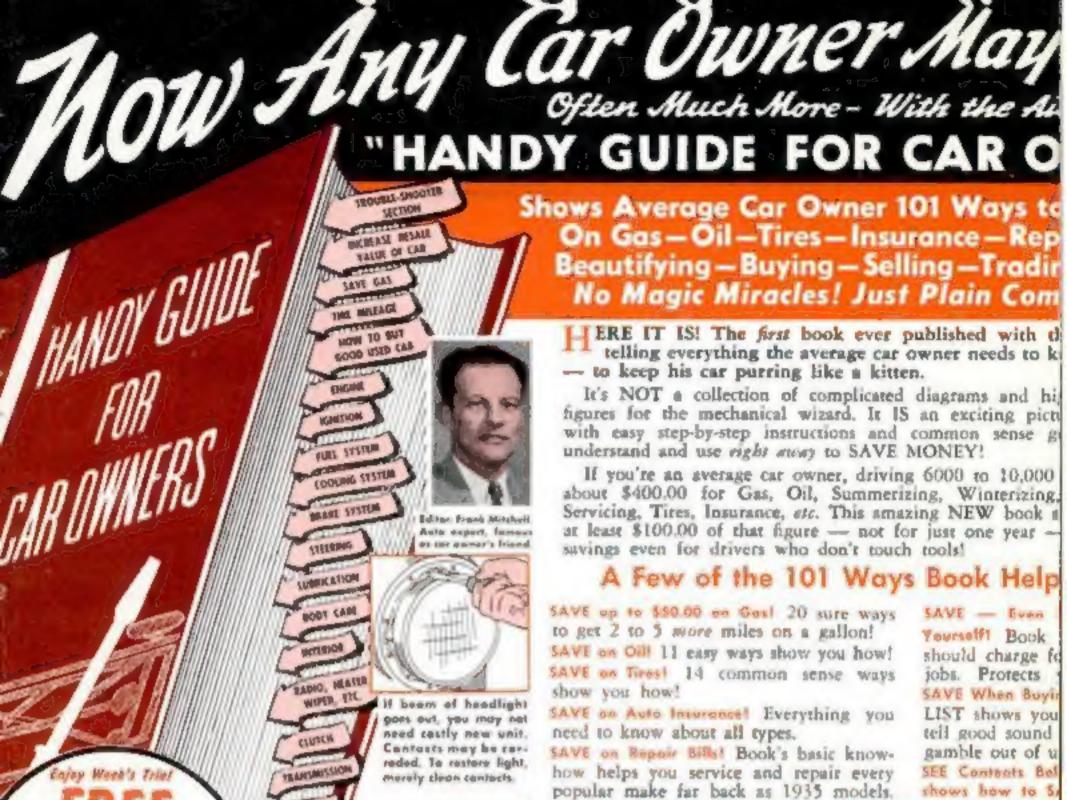
Rush Free Sample Outfit at once. (If you own a car include the following information):

Make\_\_\_\_Year\_\_Model\_\_\_\_

Address

City.....Zone....State.....

Copyrigated transmit



### Price Slashed IN HALF to Win New Friends!

Where other publishers might charge about \$6.00 for a comparable book, WISE SLASHES that figure in half-way down to only \$2.95. Payable only \$1 monthly! But first, week's FREE Trial must con-

vince you book will help you save least \$100,00 a year - EVERY year or return it and owe nothing! Send I money. Cut out and mail FREE To Card NOW!

Get 2 to 5 More Miles on a Gallon! Up to Double Mileage on Tire Do Your Own Repairs! Add Longer Life, Greater Value, More Pov Here's Partial List of Vast Money-Saving Contents Crammed into Bi

Under this Amazing

Savings Guarantee!

lest book 7 days at our expense.

If not convinced it will help you

tave \$100.00 a year, return it

and owe nothing.

SAVE \$10.00 to \$20.00! Unsightly lender dents are easily removed, sometimes pop right out after few hammer taps. Just one of scores of repair jobs any amoteur can easily do with help of

Save on Tires

DEAR THE

SPECIFICATION.

Gas Savings Remove, Clean

Out and Replace

Adjust Carbureter

And Lots MORE:

Lubrisation

How to Trace and

Oli Pump Line

How to Prevent

Correct Lenks

How to Install

Undercoating

And MORE!

Ou Dilution

How to Repair

Clogged Line

Gas Tank

Blowout Protection Cross-Switching And Much MORE:

Spec Frotions

For All Popular Makes Far Back

Rolly on Broken How to Make Fust Brake-Safety

Test How to Adjust and Re-Line Bruker Lets MORE!

To clean air filter, remove as

shown, wash in goseline, dip in

engine oil, drain and replace.

Auro Warrey

Battery Care Repair Shorts and Breaks How to Repair or Replace Heaters Direction Signals.

Lights And Lots MORE: Rear End Repair

Dismacmbly. Adjustment and Assembly of Rear Wheels. Drums, Axle. Bearing.

Universali. And Much MORE!

#### TROUBLE-SHOOTER SECTION Shows You How to Correct 88 Common Car Traubles!

How many of these troubles are robbing you of top performance and enjoyment from your car? Engine Wup't Start - Misses - Knocks -Overheats - Backlices - Stalls Frequently - Genry Grind - Cur Fulls to One Side - Annoying Squeaks - Strange Nobes - Singrish Pick-Tip - Horn Keeps Blow-Defroster Doesn't Clear Windshield - Etc.

Big, handy TROUBLE-SHOOTER SECTION shows you how to quickly locate and correct \$4 common cor treubles-without paying high labor costs. SAVE towing charges!

Front End Japair

Disnasembly. Ad a twest and

Assembly of

Propt Wheels, Shock Absorbert Transmission.

And Lots MORE:

Steaming

How Much Play Is Too Much How to Tighten Loose Steering: Adjust Wheel Altenment And Much MORE!



Gean and adjust points periodically for faster pick-up and more gas mileage.

### Exhaust System

Disassembly, Adjustment and Assembly of: Muffler, Exhaust Pipe, Munifold Pipe How to Repair Leak from Exhaust or Intake Manifolds And Lots MORE!

Cooling 5 How to Rep

Clogged P Pump; Bri Thermosti installing P How to WI Summerte And MORE Engion Tu Testing: ing; Clear

Battery: Vacuum At Firing Or Spark Plu Points, Ca tion: Cho Ocnerator And Lets Engine R

Remove an Replace: Rings, Cyl Head, Cra Hoses, Gr Remove - MORE

Scorer Chapter

Body & Fr Valves, Ca Much More Wm. H. Wise & Co., Inc. 50 West 47th St., N. Y. 36, N Y

Book Crammed with Show-How Pictures, Charts, Diagrams! Full Library-Size - In Sturdy Washable Binding

Instructions Anyone Can Understand!

Big Double-

Column Pages

of Step-by-Step

Ways to Save on

Service, Maintenance,

and Repair of Your Carl

Cut Out and Mail this

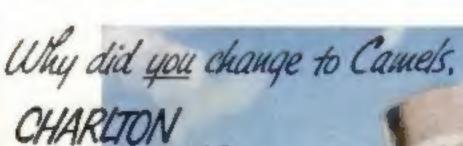
# More people smoke

# ANDELS than any other cigarette!



CHARLTON HESTON's newest movie is "PONY EXPRESS"

There must be a reason why camel is America's most popular cigarette. That reason can be only one thing; greater smoking enjoyment! What better evidence could there be that you'll like Camels best, too? Try Camels this sensible way: smoke them for 30 days and see how Camel's mildness and flavor please you pack after pack!

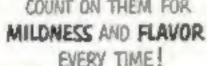




He is one of Hollywood's newest exciting stors.

I'VE SMOKED MOST OF THE LEADING BRANDS AND FOUND THAT CAMELS SUIT ME THE BEST. I CAN COUNT ON THEM FOR

HESTON?





Like so many stars, Charlton Heston is a Camel smoker.



R. J. Reycolds Toharge Co., Wicolon Salem, N. C.

Start your own 30-day Camel Mildness Test today!